The Builder.

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American Methods of Forming Foundations.

THE rapid development of the resources and the opening-out of immense tracts of territory in a new country may be expected to evolve new methods of solving old problems to an extent which, in the older and more settled countries of Europe, is scarcely probable, and considerable interest must, therefore, attach to a review* of what has been, and is being, done in America in any such subject as that of foundations—as, indeed, in any problem of construction or practical arrangement where new conditions may be expected to give rise to, and occasion for, new ideas.

The conditions which make for the safety of foundation-beds, understanding by the term "foundation-beds" the strata of the natural earth on which the artificial construction rests, necessarily are the same in America as in Europe. The rocks of America are, considered as "foundation-beds," practically the same as here; the importance of level—or, at least, non-slipping—beds equal, as is also that of uniformity of material, and, consequently, of settlement. We can understand the preference given to clay over sand or sand and gravel, rather than the opinion of some authorities who would class the three kinds of soil as equal in bearing-power and desirability. Clay is apt, as a general rule, to be superior for the reasons stated by our author, as well as on account of another cause that he omits, the general prevalence of thickness of stratum as a characteristic of clay beds, which tends to produce the uniformity of settlement that is so desirable in any foundation-bed not absolutely incompressible. American experience shows, in relation to clay, that with a good indurated bed 5,000 lbs. per square foot has been safely placed upon it. The same figure may be taken for sand, if properly secured from lateral shifting, and, *à fortiori*, for gravel. These figures are considerably in excess of the figures given by Rankine. Here, then, we have one instance where the endeavour, which so usually accompanies constructional work in America, to cut things fine has been successful, and affords a fresh starting-point for European practice. Even in England there are instances where such loads have safely been put upon soils which caution might have considered dangerous. For bridge building, with which the work we have before us is largely concerned, the important element of scour, or water action, has to be constantly remembered.

The preparation of concrete in America is similar in methods to those adopted here, save that in the examples quoted cement is more generally used as the matrix than lime, and the proportion of cement is slightly higher than is used by architects. Both of these differences result from the fact that in the examples before us the work is of an engineering character, and hence more subject to the stress of water action. The cement used is apparently always of German or native production, and is inferior in grade to most English Portland cement. In passing we may note that one reason, and the chief one, why English cement is not more used in the States, is that it is of too high a quality to compete in price. If our manufacturers wish to supply the American market they must fit their goods to the quality that satisfies that market, and they will then be able to make their price both lower and more profitable.

With one statement in reference to the use of concrete we are rather at issue. The American view seems to be that spreading footings under a wall resting on concrete is needless, but except when the concrete is exceptionally well bonded and cemented such a course practically amounts to the waste of a considerable section of the concrete foundation.

The generalities in which our author deals in speaking of stone and quarrying do not specialise America from Europe, and, indeed, it is hardly possible to do so when considering only broad principles. To a great extent the same applies to masonry. The methods of stone working usually do not differ from our own. Difference of opinion prevails on the other side, as here, in relation to some points. Grouting, for example, has its advocates and its opponents. The backing of ashlar masonry, too, finds various theories or ideas to regulate it. Some think that backing should be of large stones of the same height in course as face stones; others are satisfied that concrete, or even rubble, walling is good enough. It is interesting to note that the avoidance of too rigid conditions in the specification of masonry work is advocated as tending to increase the quality of the workmanship. The stone-worker or quarry foreman if left to himself to a certain degree can, and will, select stones of sizes to give good work better than if the precise size were specified.

The effect of ice pressure is a matter which in America has more interest in the design and construction of foundations of bridges and other structures in waterways than here. The immense amount of ice which accumulates in some American rivers, such as the Susquehanna and Schuylkill, causes enormous and unknown pressure upon the piers of bridges, and instances are given of bridge piers having been lifted bodily from their beds by the force of the ice expansion. It is, however, not only the question of the expansion of the ice, but the still more momentous effect of moving ice, especially prevalent in the early part of the year, when an "ice-gorge," as it is called, forms, and is urged forward by the early freshets. The best means of resisting the dangerous impact of moving ice appears to be the provision of substantial cut-waters or starlings of masonry, such as we universally find in Mediæval bridges. Cut-waters, too, are invaluable as a safeguard against the drift which rapidly flooding rivers often collect in large quantities, and which in America is only less formidable than ice.

The question of retaining walls is from the varying nature of the soil needing support so exceedingly inconstant that it is not surprising that the theoretical deductions of Rankine and Moseley, which are studied on this subject by Americans, receive but little respect, inasmuch as they give results which entail a larger expenditure of material and, therefore, of dollars, than is usually required for the sake of safety. The results of parsimony have, however, frequently been the cause of disaster in America, and, we need hardly remind our readers, occasionally in this country also. Many of us can remember to have seen retaining-walls showing signs of failure, either by sliding, by bulging, or by overturning.

The theories of arch construction meet

* "A Practical Treatise on Foundations." By W. M. Patton, C.E. New York: John Wiley & Sons. London: Kegan Paul, Trench, Trübner, & Co., Lim.

with no more reverence than those relating to retaining-walls, although they are studied and known by the American engineer. Skew arches, on account of the extensive knowledge of stereotomy which they require from the workmen, are falling into disfavour in America as well as here, and devices are adopted there to get over the difficulty just as we notice in the widening of some of our own great trunk lines.

Bricks and brickwork are similar in their make and use to our own, save that considerable attention has of late been directed to what we may call bricks of fancy colours, which, though intended for facing, are nevertheless referred to by our author as foundations. The American architect has now at his command a large variety of tints and peculiar textures in his brickwall surface; indeed, the desire for novelty of effect in this matter has been rather overdone, and the result is often fussy and unpleasing. We are somewhat surprised to note that the superiority in strength of English over Flemish bond is ignored, and that it is considered "probably immaterial which is used." Perhaps, however, we are in England inclined to attach too much importance to the fancied superiority of English bond, as, although there can be no doubt of that superiority it the bricks were laid dry, yet in a wall the work of the mortar has even a more pregnant bearing upon the strength of the construction than the bond of the bricks.

America is rich in highly hydraulic limes or natural cements, particularly in the Middle States, and these are frequently used where we should use a less hydraulic lime, and obviate the necessity of using ordinary lime concrete or lime mortar underground. There can be no doubt that the objection to the use of lime for works under the ground line, where they may be exposed to the action of moisture, if not of water in visible quantities, is a valid one, and the recommendation that a natural cement, should be used is good, and is indeed often adopted in good work over here. The influence of temperature, whether of the atmosphere or of the water used for mixing cement, is well known and acted upon in America, and is worth remembering when rapid setting is desired. The use of a mixture of lime and cement is a debatable question amongst our friends across the water as amongst ourselves, and the truth appears to us to be that some kinds of lime may be mixed with some kinds of cement without appreciable mischief, but that with other limes and other cements the case is reversed.

The cost of work in America seems, measured by merely cash value, to be higher by, say, about 20 per cent. in round figures, but it must be remembered that labour is dearer in the States than here.

Timber for foundations is used far more largely in America than by ourselves, not only for piling but as planking under walls and for cribs to contain concrete or stone foundations for piers of bridges and other water-side structures. It is to be noted that the use of timber for foundations is, however, never thought desirable unless the wood always remains wet. Timber appears to be usefully employed where the foundation bed is of very soft nature, such as silt or quicksand, inasmuch as considerable distribution of the load, and hence decrease of the unit pressure, can be economically effected.

The timbers used in America for the purposes of foundations are principally the white pine of the North and the yellow pine of the South, the latter being somewhat superior in hardness and strength. The spruce pine grown in the Middle States seems to be inferior to either of the above in strength and durability. An interesting point in connexion with these woods is the discussion as to the injury that is or is not caused to the quality of the timber by bleeding the trees of their resinous matter. The forest owner and the saw-mill owner maintain that the practice is not injurious, but their testimony is looked upon with some suspicion, as the one finds an extra profit in the turpentine and resin and the other less labour in converting the trees. Experiments have been made which seem to show that the deprivation of their resinous matter does not decrease the strength, and this a brief consideration of the function performed by these juices in the growth of the tree would justify, but it is an open question whether the durability of the timber may be decreased, and time alone can solve the problem. Oak grows throughout the States, but differs very materially in quality, and this difference depends rather upon the nature of the soil than upon climate or latitude. Cypress timber is grown largely in the Southern States, and, though it has not the strength, exceeds the pines in durability, the blade cypress being especially good in this respect. Chestnut, poplar, elm, cedar, and other woods are too valuable for use in foundations, save in exceptional local circumstances. Thus, in Central America, lignum vitæ and mahogany have been used. The average life of timber, when exposed and not covered or preserved by some artificial means, is stated to be in America only some eight or ten years. This, therefore, leads to preservative processes being sometimes adopted, and we find that the American engineers recognise the value of creosoting as the best of all means of increasing the durability of timber; but the great expense, increasing the cost of timber from two to two-and-a-half times, tempts employers to follow the plan of letting the timber rot, and renewing it when necessary. For foundations, strictly speaking, such a course is suicidal, but for supporting structures above ground it is very generally followed. A rival to creosoting has been introduced in America, which, if the claims put forward in its favour can be justified, must prove a powerful competitor. This is called "vulcanising," and is defined as "heating wood and timber under great pressure." The wood is heated, in closed cylinders of steel 105 ft. long by 6½ ft. diameter, at a temperature ranging from 300 deg. to 500 deg. Fahr., under a pressure of 150 lb. to 200 lb. on the square inch. The rationale of the process is that in the destructive distillation of wood a powerful antiseptic is produced, and the method of vulcanising aims at the formation of this antiseptic and at the same time the retention of the valuable preservative in the pores of the wood by the great pressure applied. It is claimed that "the process of vulcanising seasons all timber, preventing any further warping, checking, or cracking. Such timber is not influenced by atmospheric agencies, bacteria or spores, and requires no paint for protection. The albuminous constituents of the natural wood have been coagulated by the high heating and rendered insoluble." This sounds rather like tall talk, but it has a considerable degree of plausibility and a logical scientific explanation. Experiments also appear to justify the claim made, as they show that "vulcanised" timber is increased in strength as much as 18·78 per cent., and the amount of deflection under load decreased by 13 per cent. As regards durability, frames made partly of vulcanised timber and partly of timber in its natural state have been found, after eight years' exposure, with the prepared timber sound and solid, but with the parts made of natural timber almost entirely rotted. The credentials of the process so far satisfied Mr. Tracy, late Secretary of the American Navy, that he recommended that vulcanised timber should be used in ships constructed for the United States Government.

The construction of cofferdams, both single wall and double wall, is well understood in America, and the fact that too small an enclosed area is false economy is well recognised. So, too, with the use of caissons, both the open and the iron cylinder form as well as the pneumatic caisson. In using this last device the vacuum method is seldom used, preference being almost universally given to the compressed air system. The use of pneumatic caissons is limited to 100 ft. in depth chiefly on account of the strain on the men's health from the pressure and the high temperature. The author's observation, from his own experience, on the causes of the deleterious effects often resulting from working in compressed air, and the best means of minimising these, deserve careful attention.

The Poetsch freezing process, though used largely in Europe, and in spite of its value for deep sinking through treacherous material such as quicksand, has been employed only to a limited extent in America. For dealing with quicksand the expedient of introducing, by means of pipes, cementing material, and so consolidating the quicksand, has been successfully employed.

The enormous height to which modern buildings in Chicago are carried, and the difficult nature of the subsoil, have caused the subject of foundations for high buildings to assume considerable importance. For the buildings of the World's Fair a careful examination was made of the strata overlying the bed rock, and in many of the borings made the result appeared thus: upper surface black soil, then sand 5 ft. to 8 ft.; quicksand, 4 ft. to 10 ft.; soft clay, 6 ft. to 10 ft.; soft blue clay, 6 ft. to 10 ft.; blue clay; hard blue clay; hard pan. Average depth to hard pan 26 ft. to 36 ft. below surface. Such conditions necessarily require special precautions where great loads have to be carried on comparatively small areas. Where possible the practice has usually been to spread the foundations so as to limit the unit of pressure to 3,000 or 3,500 lb. per square foot. Piling has been tried, but has not been considered satisfactory, or even an improvement on the former method. It has been urged that pillars of stone with polished beds should be taken down to the bed rock, but the expense of such construction has been objected to, and spreading foundations of concrete and steel have been more favoured. These are made up of a bed of concrete at bottom, then a layer of steel beams transversely to the wall crossed by a second layer at right angles, and these again by two other rows similarly disposed. The steel rails are encased in concrete, and the foundation so formed has the advantage of less weight and less height than a masonry construction of the same bed, so that an additional story is gained. Many of the lofty buildings of Chicago have foundations of this character, and no serious settlement has followed their adoption.

In the case of the City Hall of Kansas City, which stands on 50 ft. of made ground, another method has been adopted. Holes were bored by means of a large auger 4 ft. 6 in. diameter, an iron cylinder followed the auger. When a solid bottom was reached the cylinders were filled with vitrified brick well bonded. A somewhat similar method is proposed to be used in the foundations of the New Manhattan Life Building of New York. The caissons will be built of boiler plate steel, and will be from 10 to 15 ft. diameter. These will be sunk by the pneumatic method, and the piers will consist of hard-burnt bricks in Portland cement, capped with several courses of granite to receive the bed plates for the columns.

The volume is a valuable contribution to the list of practical treatises on this class of subject.

THE SWEDISH TIMBER INDUSTRY.—In view of the important *rôle* played by Swedish timber in our building industry trade, it may be of interest to mention that from statistics just issued it appears that one-half of the area of Sweden, 40,584,532 square kilomètres, is covered with forest, principally pine and spruce. The public and crown forests cover 7,307,000 square kilomètres, which last year yielded a revenue of only 85,000*l.*, or less than 4*d.* per kilomètre. This pitiful result is due to the want of communication. The total value of the raw, sawn, and hewn timber exported from Sweden last year amounted to 6,200,000*l.*, and that of prepared wood-goods, building material, &c., to 1,320,000*l.*, making a total of 7,520,000*l.* Of this quantity, about two-thirds are imported into Great Britain.

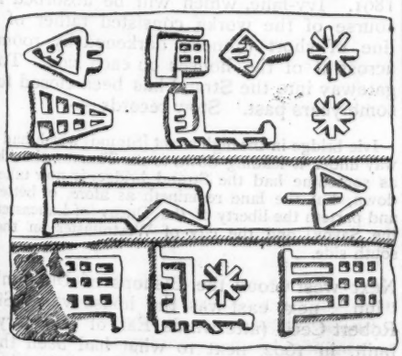
BABYLONIAN BRICKWORK AND BRICK STAMPS.

THE discoveries made during the last few years in the ruins of the ancient cities of Chaldea have carried our knowledge back to a very remote antiquity, at the same time revealing many interesting and primitive customs.

The important results of the expedition of M. de Sarzec, which have so enriched the collections of the Louvre with the antiquities from Tello, the ancient Sirpurra, have now been supplemented by some most important archæological finds made by the American expedition, sent out by the University of Chicago to explore the ruins of Nuffer, the ancient Nipur, in central Babylonia. One section of archæology upon which these excavations in Chaldea have thrown much light is one of especial interest to the readers of the *Builder*, namely, the early customs and manner of brickmaking and the ceremonies connected with the laying of the foundation stones of buildings.

Babylonia was probably the land where the art of brickmaking originated—indeed, this seems to be implied by the Hebrew tradition of the building of Babel, "let us make brick" being the command on settlement on the plains of Shinar (*Sumir*), South Babylonia. This meets with confirmation in the inscriptions, for we find in the old Akkadian Pantheon a "God of Bricks," and a month, Sivan (May-June), called the "Month of Brickmaking," because it was the month when the alluvial clay deposits were sufficiently dry to make the bricks. As a month was named after the work of brickmaking, the custom must have been very old. Its antiquity is indicated by a curious passage in a very old creation tablet, which reads: "A brick had not been laid, a beam was not shaped," that is, no work of creation had begun. The God of Bricks was a very important one in the castes of Babylonia, and had as his companion the god Dullum, the "God of Work."

Babylonian bricks have been discovered during the last few years of very great antiquity, the oldest being those of Urnina and Entena, which bear only rudely scratched inscriptions, and these may be assigned to a date as remote as B.C. 4000 at least. The explorations of Dr. Peters and the American expedition at Nuffer have resulted in a very interesting discovery with regard to inscribed Babylonian bricks. Here they found several bricks bearing inscriptions of Sargon I. and Naram Sin, his son. The date of the reign of the latter of these monarchs is fixed beyond doubt as 3,200 years before the restoration of the great temple at Sippara by Nabonidus in B.C. 550, which gives him therefore an antiquity of B.C. 3750. Owing to the large number of bricks which had to be stamped with the name and titles of the king, or the name of the edifice, the Babylonian brickmakers had invented and introduced the use of the brick stamp. We



give a drawing of one bearing the inscription, "Naram-Sin, builder, of E-Mulil (temple of Bel)" These stamps are made of clay, and baked, and measure 11·75 × 12·08 × 2 centimètres. Thus we have the introduction of this custom known in Egypt at a later period, but in use in Babylonia before the time of the Great Pyramid.

The custom of stamping bricks, or writing inscriptions upon them, originated not only from the desire of the king to leave a memorial of himself, but also the inscription containing the name of a god acted as a charm to prevent evil from entering the interior of the building through the courses of brickwork. The work of building an edifice was one of great sanctity, and accompanied by many curious ceremonies. It must be on a fortunate day in a fortunate month. The proceedings are thus described on the inscriptions on the statue of Gudea, now in the Louvre:—"Her favourite temple he has constructed; the town he has purified and laid out; the table of offerings he has placed; the *kâl* he has caused to be brilliant; the clay (for the construction) from a holy place he has taken; the bricks in a holy place he has moulded; the brick platforms (tables) he has made; the dedicatory inscription he has given forth. Its foundation he has consecrated; the site he has made level; its line (course) he has marked out."

There were, of course, the usual sacrifices—libations of wine, oil, milk, and honey over the foundations, but there is no trace of the very ancient and prevalent custom of human sacrifice.

Among the inscriptions discovered by M. de Sarzec is a brick with a long inscription, which gives the account of the building of a city, and is important as showing the order of precedence of the different buildings; the inscription is translated numbering the buildings in their order. "Ur-nina king of Sirpurra, son of Nin-khaldu, the temple of Ningirsu (1) he made, the palace (2) he made, the temple of Nina (3) he made, the observatory he made, (4) his watch-tower (5) he made, the temple of he made, the house of seven spheres (6) he made, the burning-place (7) he made," &c. We have only quoted two columns, but those are sufficient to show the order of building. 1, the temple of the city god; 2, the palace of the king; 3, the temple of his own patron goddess, Nina: 4, the observatory; 5, the palace watch-tower 6, the seven stage towers; 7, the burning-place. This latter was a species of *ghat*, or burning-place where bodies were cremated, which seems to have been the mode of disposal of the dead in this city.

Thus we see how great evidence of antiquity, how much interesting matter, is to be gained from these recent explorations upon the history of brickmaking.

NOTES.

WE may remind our readers who are interested in hygienic questions that the Eighth International Congress of Hygiene and Demography is to be held at Budapest in September of next year. We are officially informed that the preparations for the Congress are already well advanced; the papers in certain sections have already been selected, and about the beginning of next month it is expected that the series of questions and subjects for all the sections will be formally made out. We are glad to learn that the Executive Committee, acting in a truly practical spirit, are especially desirous to realise as far as possible the decisions come to at the London Congress, and special committees have been organised with the object of considering and giving effect to the decisions or resolutions approved at the general meeting in London.

IT is much to be regretted that the Trades' Union Congress pass such a multitude of resolutions practically without discussion, the time allowed for proposing or seconding resolutions being limited to three minutes. Thus, on September 8 the Congress passed more than a dozen resolutions. The first was so lengthy that the three minutes of the mover must have been occupied in reading it. It practically asked for any number of things from the Government in relation to Government contracts which would favour the workman at the expense of other members of the State. The Government was "to discontinue the sale of any disused Government stores in such a condition that they can be placed on the market to the detriment of the industrial classes." This is a sample of the utterly unpractical and selfish character of the resolution. The workman would prefer waste in the despatch of Government business if it would bring money into his pocket, rather than careful administration if even for a moment it delayed work coming to his hands. Again, the Government was asked to discontinue the employment of juveniles who supplant competent adults. An adult can always do the work of a lad, but if a lad can do it equally well at half the cost no man of business will employ the adult. Another resolution moved by Mr. Keir Hardie was to the effect that it is the first duty of the Government of the day to provide profitable employment for those workmen who are out of work. We should like to ask the members of the Congress who adopted the resolution why Government aid is to be given only to the so-called workmen who are out of employment. If the iron-worker is unemployed, and to be given work, why not the doctor or the journalist? Why also should the workman who by sobriety and energy obtains employment be taxed for the benefit of the inefficient workman? Many artisans appear to regard the State as a goldmine, whereas, of course, it is only another name for the collection of persons comprised in the nation. Asking the State for employment is only a grandiloquent form of begging alms from your neighbours who happen to be the members of the State earning money. If every member of the State demanded State employment the population would simply be preying on each other.

THE withdrawal by the Government of the Equalisation of Rates will be a disappointment to London. Though there is not unanimity on the details of the measure, there is a general consensus of opinion on the necessity of equalising the incidence of the rates throughout the metropolis. The measure was a short one, and would not have occupied much time in its progress through Parliament, and might easily have become law had the Government been willing to devote some small amount of time to something besides Home Rule. The loss of the Bill shows in some ways the drawbacks which attach to our system of Party Government, since this non-political measure is allowed to be pushed on one side by others which are considered likely to be more useful from a party point of view. Many Londoners will consider that their interests have not been sufficiently safeguarded by their members.

WE were much struck on a recent visit to the Portland stone quarries to find that enormous quantities of good stone are daily thrown away, whilst in some cases, on the other hand, a comparatively inferior material, from the point of view of durability, is sent to the market. The two strata known as the "roach bed" and the "whit bed" are not separated from each other by a divisional plane, but the former merges imperceptibly into the latter, and the quarrymen decide where the one begins and the other ends, in each working. Much of that included under the term "roach" is full of large holes, caused by the removal of shells by the action of percolating water; and this is not of much use for building, although exceedingly strong and suitable for rough sea walls, engineering purposes &c. A very large proportion of the "roach," however, especially near its junction with the "whit bed," is not so full of cavities; they

only make their appearance here and there in the stone. This better class of "roach" is a very fair building stone, and eminently suitable for ashlar, though it could not be used for mouldings and the like. It is, moreover, very durable, as testified not only by its properties from a scientific standpoint, but by its behaviour in the walls of St. George's Church, Portland, erected in 1764, and in other buildings in the island. Indeed, we incline to the opinion that this rough-looking material is quite as durable as the best Portland stone. In most edifices where the "natural face" or "rustic face" of stone is left on the exposed surfaces this class of "roach" could be profitably employed. Yet tens of thousands of tons are annually wasted, because, we are informed, there is no demand for it. We feel sure that it has only to be better known to be extensively made use of.

SIR HERBERT MAXWELL has written an opportune letter to the *Times* on the subject of London trees, in regard to the effect of this exceptional summer upon them. Trees are necessary for the beautifying of London, but it is necessary that care should be taken to plant chiefly those which are found to flourish in the Metropolis. There is no more miserable sight than a tree struggling to live. But after all, this hot summer has only confirmed conclusions which have been arrived at by careful observers of tree life, not only in London, but in the dry southern counties. The plane has come well out of the ordeal, but this tree has for some time been recognised as that which is most suitable to the London soil and climate. That the horse chestnut and the lime have suffered severely might have been expected. The former likes a damp stiff soil, and both soil and temperature have been adverse to it; the lime every year is seen to shed its leaves earlier than other trees; the fine summer has but accelerated their fall. Again, the ailantus—"The tree of heaven" (not "the tree of the Gods," as called by Sir Herbert), and the so-called acacia, have done well, but here again the reason is obvious; these trees like a dry soil, and a tree which enjoys a dry soil is actually benefited by a dry summer. The moral is clear. Let the authorities plant in numbers the plane and other trees which have been proved to bear well the dry London climate; but at the same time they should not neglect entirely those trees which do not grow vigorously in the Metropolis; the latter with attention in the planting may grow fairly well, and they add to the variety of the foliage; but they must only be used as accessories to the main body of what may be called London living trees.

THE Fortieth Report of the Department of Science and Art gives us, among much other information, extracts from the opinions of the examiners on the work of the students in various classes. Mr. Louis F. Day considers the design of ornament to be the point in which the students seem weakest, though it comes up this year to the average of former years. He observes that there appears to be a mistaken idea on the part of students that a design with beasts, birds, or human figures in it is more worthy than mere ornament, whereas even good figures may be quite out of place in ornament unless they help the design, and the students seem to put them in with no object of that kind, merely to fill up a space. In elementary architecture the examiner, Professor Roger Smith, considers the work done by those who have obtained good marks as satisfactory (it is to be hoped so, or why would they have the "good marks"?), but he can hardly say as much of those who have failed to pass or only just passed: in other words, we presume, there are a few good dra ings and a great many bad ones. Our own impression from looking at the prize drawings from year to year is that the architectural students want pulling up very much, and that examiners are too indulgent. In architectural design the same verdict seems to be passed; a few good, a majority very bad. In Principles of Ornament Professor Aitchison reports the advanced stage papers as very creditable, but there is "an inclination to make designs without regard to the material in which they are to be executed." He recommends that all beginners studying the principles of ornament should go through an elementary course of geometry; "that would enable them to draw the best-known forms and curves and the various network of simple geometrical figures that will fill spaces that are wanted for diapers, and the foundation for repeating ornament." In regard to Historic Ornament Mr. J. Hungerford Pollen reports well of the work of the students; the number of candidates is much smaller than last year, but the quality of the papers is higher. In the various departments of modelling a generally prevalent improvement is noticed, but the examiners (Messrs. Armstead, Brock, Thornycroft, and Onslow Ford) report that in "Design with Figure" "there is a preponderance of work based largely on the employment of Renaissance scrolls," a criticism which certainly cannot be confined to the students of the Science and Art Department. In the design for carpets, hangings &c. Messrs. W. Morris, Lewis Day, and Alan S. Cole report a decided falling off in quality, and in the class of cotton hangings and prints "no gold medal has been awarded" this year, which, considering the generous manner in which medals are usually showered around, seems to say a good deal. There appears to be a special set of reports on the works which have received medals, from which we learn that many of the studies sent for Historic ornament are too careless in execution, and in regard to architectural design it is noted (and very rightly) that the examiners "would like to see some of the mouldings drawn full size and accompanied by perspective sketches of them to a smaller scale showing the actual effect of light and shadow." There could be no better study.

A PAMPHLET by Sir Spencer Wells on "Cremation and Cholera"* (a reprint of a recently published magazine article) deals with other matters besides cremation, and we reprint from it one paragraph containing some recommendations which are not of course new to most of our readers, but perhaps cannot well be too often repeated:—

"The house-cistern may be another source of danger to which every household is exposed so long as the supply is only daily, not constant. If the water-companies obtained their supply from sources not liable to pollution, neither filtration nor boiling would be necessary. But then there should be a constant service, and no house-cistern in which the water might become impure after it had been delivered. With only a daily service into a house-cistern, stirring up any deposit every time the water comes into the cistern, every house should have its own filter. But if the filter is not pure it is worse than useless. Water that passes through a dirty filter is worse than unfiltered water. Therefore the porous part of every filter should be movable, and be boiled for ten minutes once a week. Boiling all water after filtration for five minutes is an additional and often a necessary precaution, and in all epidemics of such spreading diseases as are carried by water, like typhoid fever or cholera, it is advisable to boil all drinking water for fully five minutes, and all milk which may have been diluted or adulterated by the addition of water. A constant supply of pure water being the most certain means of checking the spread of such infective diseases, the first demand should be in all towns for purer water than can be had from any river, however well the water may be filtered. Next, we must have a constant supply of it, and abolish all house-cisterns."

Sir Spencer Wells's instances, in regard to cremation, of the cases in which the outbreak of disease has been distinctly traced to the disinterment of buried remains, are very strong; so strong that on the face of these statements by themselves it might be said that the enforcement of cremation was a State duty. Other medical authorities, however, differ as to sanitary effects of cremation, and it is no part of our business to express any decisive opinion on questions which are mainly medical. Our impression is that cremation is likely to be much more widely accepted as a method of disposing of the dead, but a decisive opinion is only to be formed after a dispassionate consideration of all the evidence that can be collected from all sides in regard to the sanitary effects of different methods of burial; and this evidence is not to be had in any generally available form at present. In the meantime we may note Sir Spencer Wells's emphatic declaration that "it is in vain to hope for the abolition of cholera if its bacilli are still to be preserved by burying in the earth the bodies of the victims": a dictum which certainly ought at least to be carefully weighed and considered by sanitary authorities.

* Published by the Cremation Society, London.

NOS. 28 to 31, Southampton-street, Strand, have been pulled down and are now being rebuilt; Nos. 30 and 31, after the designs of Mr. J. T. Woodard, architect, and the other after those of Mr. J. Randall Vining, architect. No. 30, at the corner (south) of Maiden-lane, on the Duke of Bedford's estate, was occupied by Messrs. William Dart & Co., successors to Godfrey & Cooke (No. 31), established in 1680, and claiming to represent the earliest still existing druggist and chemist's business in London. We learn that some photographs were taken of No. 31, and of its old parlour and laboratory. The street's name commemorates the marriage of Lady Rachael, the fourth Earl of Southampton's daughter, and William, Lord Russell, son of the fifth Earl of Bedford, whose ancestor had built Bedford House on this site, on quitting Carlisle, or Russell, House, on the Strand's south side. Southampton-street has been the home of Mrs. Oldfield, actress, and, in the winter of 1714-15, of Colley Cibber. On the west side is No. 27, into which Garrick moved from King-street, Covent Garden, on his marriage. It is the house from which Dr. Johnson was seen touching the posts, according to his wont, as he walked down Tavistock-street on his way to dine with Garrick in Southampton-street. Another old landmark in this neighbourhood will, we understand, disappear shortly. It is Ivy-lane, at No. 76, Strand, the "Club Café," between Adam and Salisbury streets, whose steep descent led, until recently, down to the "Fox-under-the-Hill," where, as our more elderly readers may recollect, passengers used to embark in the steamboats, at ½d. fares, for London Bridge. The old-fashioned riverside tavern was removed for the laying out the Salisbury Estate by Messrs. J. W. Hobbs & Co., Limited, contractors, after Messrs. Perry & Reed's designs—as described and illustrated in our columns of October 20, 1888, and February 21, 1891. Ivy-lane, which will be absorbed in course of the works, consisted rather of a line of short tunnels, darkened by rooms across it of the houses on each side. The gateway into the Strand has been closed for some years past. Stow records:—

Ivie bridge in the high street [Strand] which had a way under it leading down to the Thames, the like as sometime had the Strand bridge, is now taken down, but the lane remaineth as afore, or better, and parteth the liberty of the Duchy [of Lancaster, the Savoy] and the city of Westminster on that south side.

Next west stood the Bishops of Durham's "inn"; next east was the house which Sir Robert Cecil (afterwards Earl of Salisbury) built, in 1602, next to what had been the "inn" of the Bishops of Carlisle, belonging to the Earl of Bedford. The little brook Ulebrig, rising in the Cock-and-Pye fields, flowed beneath Ivy Bridge. Strand Bridge was opposite Duchy-court, a little westward of the south end of Catherine-street.

THE vestry of St. George, Hanover-square, propose to lay out and put into decent repair their disused burial-ground in Hyde Park-place, Bayswater-road. Acquired in 1764, and extending over five acres, most of the ground has been for some while past in a sorry state of neglect. For about one-half of its length it is divided into three portions by two dwarf walls; the central portion is less crowded with graves, is better cared for, and the vaults are bricked; the northern half has but few stones. The spot of Sterne's interment here does not seem to be known, and by one account, his body was taken away to a dissection-school at Cambridge, where it was at once recognised. So says Malone: see Sir James Prior's "Life of Edmond Malone" (1860). The present head-stone, beneath a sycamore tree, near tablet "7" on the west outer wall, was set up, near his supposed grave, by "two brother Masons," who "rejoice in this opportunity of perpetuating his high and irreproachable character to after ages. W. S." The inscription says Sterne died on September 13, 1768; as a fact he died on March 18 of that year, in his lodgings at the silk-bag maker's shop (No. 41) in Old Bond-street, Here, too, were buried J. T. Smith (1833), Paul Sandby (1809), and Mrs. Radcliffe (1823). In a vault beneath the chapel, rebuilt last year, by Mr. Herbert P. Horne, was buried General Sir Thomas Picton (his remains since removed into the crypt of St. Paul's): in the old chapel we saw the monument of John Webber who, as draughtsman, accompanied Captain Cook on his second voyage of discovery. The vestry will apply for a faculty to enable them to improve the ground, and to remove or alter the position of the monuments.

IN the *Sydney Morning Herald* for July 29, we have a verbatim report of a very good paper read by Mr. G. Allen Mansfield at a meeting of the Sydney Institute of Architects, under the title "The Architect, the Engineer, and the Contractor." In the course of the paper Mr. Mansfield touched on the subject of the new style of American iron frame buildings, in which the stone walls are a mere casing unconnected with the real structure. He observed:—

"Before quitting altogether the subject of co-operation between architects and engineers it may not be out of place to refer briefly to the new development of building construction which is now going on in America, where iron and steel are made to form so large a proportion of the structure that all the rest sinks into comparative insignificance. I admit that I have yet much to learn about the details of this new system, which seems to treat the building as composed chiefly of an elaborate structure of iron framing and columns, with concrete floors, and to regard the walls as a mere skin to enclose them, but I cannot bring myself to feel that this is the spirit in which the creation of any great building should be approached. From an architectural point of view, it is impossible to believe that any realisation of beauty, grace, or grandeur can result from such a cold-blooded treatment of materials. It is certainly devoid of all poetry and of all sentiment, and to rob architecture of the poetry and the sentiment which lend a charm to so many of the triumphs is to dethrone her from her high estate, to disestablish her as an art, and to relegate her to the rank and file of the mechanical crafts."

We have already very decisively expressed the same opinion, and are glad to find an answering sentiment from the other side of the globe.

WE frequently receive from indignant architects copies of circulars sent to them offering them commissions for using this or that article in their buildings, but the Incandescent Gas Company seem to have fairly beaten the record in this kind of insult to the architectural profession. They have addressed a circular to members of the architectural profession kindly informing them that "although we do not want you to stock our goods or to sell them directly to your customers, there is yet *a very easy way of securing some very substantial profits* [this in italics] by your recommending this light." There follows an offer to collect the payment from all customers recommended by the person to whom the circular is sent, and pay 20 per cent. commission either immediately or at the end of each month, and the suggestion that "it is obvious that you can push this light more effectually amongst your friends and customers if you were to light up your offices and warehouses with these burners," and the document concludes as follows (the italics are in the original):—

"It is needless to say that the fact of you yourself having adopted this system in your establishment would give confidence to all your customers, and would induce them more readily to adopt it and to place an order with you for us. I beg you to give this matter your careful consideration, and I have no doubt that such an arrangement would be a *good source of profit to yourself* if you follow out the advice given in this letter, and in case you should require further advice or any support in pushing the lights, we are prepared to assist you as far as we can. I shall be pleased to hear your opinion about this proposal, and I beg you to let me know whether you are inclined to light up your establishment with our burners, and I can assure you that I shall do everything to assist you in pushing the burners amongst your friends as much as I can, and I have no doubt whatever that the proposed arrangement will be a highly satisfactory one for both of us."

Can it be believed that this has actually been sent to architects holding a high place in the "profession or art" of architecture? From some parts of the wording of the circular we imagine it was not originally intended specially for the benefit of architects, but that the manager of a company of this kind should be so utterly ignorant of the status and principles of professional men as to insult them with such a circular seems almost incredible.

BUILDING MATERIALS AT THE CHICAGO EXHIBITION.

THE architect who journeys to Chicago in search of new materials, appliances, methods, and ideas, will speedily discover that, were this the sole object of his visit, he would have done better had he remained at home.

Amazingly large as the Exhibition is in very many particulars, it is notoriously incomplete in architecture, using that word as covering every art and industry directly relating to architecture, and which thus includes building materials, methods of construction, illustrations of the trades and industries dependent upon architecture or concerned in any way with the production of buildings, as well as the more artistic side illustrated in the architect's drawings and personal work. Such an exhibition might most advantageously have been included in the scope of an Exhibition which embraces special buildings for Horticulture, Transportation, and Forestry. A horticultural hall is no new adjunct to an international exhibition, though its practical utility, a quality quite distinct from its artistic and popular value, may be doubted. But the Chicago Exhibition is the first to give a structure of the first-class to "Transportation," and the department of Forestry receives here very full and unusual illustration. The time will doubtless come, if we have not had a surfeit of international exhibitions, when an Architectural Building, that will provide accommodation for the whole subject, artistic as well as practical, will be considered as much a matter of course as a manufacturer's building or an art gallery.

Some idea of the lack of system shown in the installation of exhibits concerned with architecture may be gathered from a brief review of the location of the exhibits. First of all, the architectural drawings are in the Fine Arts Palace, where, as architectural drawings are most generally considered, they should properly be found. The effort to keep all the drawings together has only been partially successful, so that the disintegration of the architectural exhibits may be said to begin at the beginning. Building materials, stones, clays, bricks and the like, are mostly in the Mines and Mining Building. Here, at all events, the largest part of the American display has been placed, and here, according to the classification, they ought properly to be. But one is only certain to find the American materials in this building, for many foreign countries are not represented in it at all, and whatever they may have to show in materials must be looked for in other buildings. The only guide to location is the ascertaining of what building contains the most numerous exhibits from the particular country we may be in search of. Generally, it is the Manufactures Building, but one can only feel certain after a personal inspection.

The Manufactures and Liberal Arts Building contains a variety of exhibits which have an architectural interest. A section in the North Gallery contains a miscellaneous exhibit, such as paints, lathing, window fixtures, and the like, while skylights and a few architectural drawings are close at hand. It is a most depressing collection, because of its incompleteness and diversity, though several of the exhibits are of the highest interest. The galleries of this building also contain all the educational exhibits of the Exhibition, and the student in search of illustrations of architectural study in America—for foreign countries make little show here, though several well-known English and German schools are represented—will find much of interest, though almost lost in the enormous mass of educational exhibits, apparently coming from every school and college in America. Downstairs, on the main floor, the great department of Manufactures is placed, and here will be found the bulk of the more general exhibits. As is quite natural, the American section is the largest, and fills nearly half the area. Several sections, separated almost as widely as possible, illustrate architectural subjects. In the north-west corner various constructive exhibits have been placed, including bricks, building tiles, artificial stones, fireproofing materials, and the like, and a large variety of roofing materials and devices. The pilgrim in search of architectural subjects must walk half the length of the building before he reaches the sanitary section. This is not very large, nor do the exhibits include much that is new, but their examination must be postponed for the present. A further instalment of sanitary exhibits is to be found in the Anthropology Building, located in one of the most distant corners of the ground.

This only relates to the American section, for the building exhibits of the foreign countries are, as a matter of course, only to be found in their respective enclosures, so that one actually has to traverse this gigantic structure from end to end with many side detours, before being satisfied that everything the Exhibition has to show in one's own speciality has been seen.

The Forestry Building, as might be expected, includes a good deal which is of interest to the architect. The display of woods is very fine, though arranged more from a forestry standpoint than with regard to architectural application. But the exhibits are extremely well arranged, and this is one of the few departments of the Exhibition that may be unstintedly praised for its completeness. A few exhibits of architectural interest are in the Electricity Building, though they are of no great importance to the architect; but the contents of the building are of the greatest interest to the electrician. Several exhibits of elevators are to be found in the Transportation Building, though other exhibits of this sort may be found in a number of the other buildings. Primitive architecture has some illustrations in the Anthropology Building, and near it have been erected some models and reproductions of primitive American architecture. Further illustrations of the same sort are provided by the villages and model structures of various uncivilised peoples which help to make up the marvellous miscellaneous annexe of the exhibition called, from its location, the Midway Plaisance.

But the architectural student has not exhausted his subject when all these buildings and localities have been visited. Several nations, of which Sweden, Brazil, and Costa Rica are conspicuous examples, have placed the whole of their exhibits in their own special building erected upon the grounds, so that if one would be positively certain he has seen everything of architectural interest, the smallest as well as the greatest, a half-dozen or so of the smaller buildings must be examined. The inconvenience of this arrangement is not affected by the fact that few of these buildings contain anything of architectural value. No unity of architectural exhibits having been attempted, the full force of this lack of arrangement can only be understood when the whole situation has been surveyed. The foreign buildings do not complete the list of structures the architect must visit, for several of the American States have filled their State buildings with their products, and further visitations and investigations are needful. It is true one is scarcely likely to find in these buildings anything but samples of building materials, either woods or stones, but these must be looked at if one would conscientiously ascertain the real extent of the architectural display. Several of the

State buildings are intended to be illustrations of the peculiar architecture or customs of the different States. This idea has only been partially carried out, since many of the States having similar resources and climate, with a population of identical character, no opportunity for individualism in building presented itself. Some of the far Western States attempt to illustrate their products in the construction of their buildings, but the experiments have not been, as a whole, successful.

The relative importance of the exhibits that may be roughly classed as building materials, may be gathered from the fact that the British exhibits under this head comprise three exhibitors, none of whom make an important display. Great Britain is worse off than any other great foreign country in this respect, yet discreditable as this meagre showing is to British pride and energy, it should not be hastily condemned. No individual or firm makes an exhibit at an international exhibition save for the hope of a financial return. In other words, though of very great educational value, they are, in practice, advertising mediums. It is because of the large advertising received from an effective and striking display, and the advertising value of medals and diplomas, that people are willing to spend thousands of pounds in preparing for a single exhibition. Now while in many departments of manufactures British producers might be amply compensated for bringing their goods before the American public, there can be little market in America for building materials, though our tiles have a large sale there. But the British tiles sold in America are more properly ornamental than constructive in nature, and hence scarcely come under the head of building materials. The United States is itself so abundantly supplied with building stones and clays that the absence of any considerable number of British exhibitors in this department is only natural.

It is much the same with other countries; unless there is some financial return likely to accrue to the exhibitor there is no inducement for private firms to make extended and costly displays of their goods. Thus it follows that, with the exception of the American section, there is little of interest or of value in any of the foreign contributions to architecture. In building materials scarcely anything is shown but ornamental marble and high-priced or rare stones, and these chiefly in small quantities.

The single exception to this almost total absence of European building materials is Portland cement, specimens of which are shown from almost every country of Europe. A few of these exhibits are tastefully arranged, but most of them are without any special interest. A notable exception is the exhibit made by the "Société Anonyme des Ciments Français et des Portland," of Boulogne-sur-Mer and Desvres, located in the Mines and Mining Building. Special mention should be made of a Portland cement drain-pipe, 18 in. in diameter, with an inner glazed surface. The glazing is beautifully done, very strong and deep, and although but one or two specimens are shown, it is one of the most striking exhibits in this department. Another notable exhibit is that made by Manske & Co., of Germania Portland cement. This firm has erected a large pavilion wholly of their product, but which is somewhat unfortunately placed behind the Machinery Hall, where it is not well seen. The "Société Anonyme Carrières et Fours à Chaux et à Ciments du Coucou," of Belgium, have an extended display in the Belgian section, strangely enough catalogued as in the Mines and Mining Building though actually located in the Manufactures Building. This establishment sends, among other things, an extended line of very bad cement statuary.

Although the larger European countries show very little in constructive architecture, Belgium is a notable exception. Several fine exhibits of marbles are shown in the Manufactures Building. The most extensive is that made by the "Société Anonyme de Merbes-le-Château." This firm makes an exceedingly fine and varied display of marble slabs, all of uniform size, polished and labelled, and of the very widest range of colour. The Société Marbrière Namuroise, of Senzeikles, near Cerfontaine, also make an interesting display, chiefly of brown, black, and white marbles. There are several other smaller collections of black marble. On the whole, this display is very good and interesting, though offering nothing novel, and it stands in delightful contrast with the meagre displays made by the larger countries of Europe. Belgium is also the only country that sends any considerable quantity of window-glass, it may be noted, in passing. Some of the plates are of great size and beauty, though their situation, immediately under a gallery, is not at all good. Stained glass is, of course, shown in other countries, as it is in a few specimens from Belgium; but this latter country is the only one that has made any special effort to send plain window-glass.

New South Wales is the only colony that makes any considerable showing at Chicago, and, strangely enough, it is one of the few countries that has made any pretence at presenting a summary of its natural resources in a complete and intelligible manner. The display is very complete and may well serve to give thoughtful Americans an insight into the boundless resources of our Australian possessions. The exhibit of building stones is particularly full. This includes granites, syenites, sandstones, limestones, and marbles, and is supplemented by collections of artificial paving stones, bricks, and brick-making clays, and a white pottery clay used in brick-making.

The collection fairly illustrates the resources of the colony in building materials. From the Hunter River District granites and sandstones are shown. The granite is grey; the sandstones have a good variety of colour, including white, buff, grey, green, yellow, and brown. The stones from Pyrmont, near Sydney, comprise granites, syenites, and sandstones. The syenite is shown rough and polished; the sandstone occurs in pink and other colours. Marbles are from various districts, chiefly from Moonbi, Mullion, and Marulan. These are very large slabs, though, as the quarries have not yet been developed, and the specimens were taken from the surface, they do not exhibit the evenness of texture that is expected to develop further down. The range of colour is extremely good, including pink, white, and black and white, all being considerably diversified. These marbles make the most interesting feature of the mineral display from New South Wales. A singular coal formation is shown, with sandstone of different colours on either side of the central seam of coal. The lesser building materials include bricks and brick-making clays; the bricks are very heavy. A white brick, made from a pottery clay by J. Forsyth & Sons, of North Willoughby, is worthy of mention. These bricks are not enamelled, though the material is used in that form also. The collection comprises, further, several exhibits of paint. It may be mentioned that the New South Wales section in the Manufactures Building contains some large photographs of buildings in Sydney built from the stone that abounds in the immediate vicinity of that city.

This almost concludes the contributions to building materials made by others than American exhibitors at the Columbian Exhibition. Mexico sends some specimens of onyx, which is used to a considerable extent in America for rich internal effects, but the specimens are, as a rule, small. A novel stone for interior decoration is the "Rose Garnet" from the same country. It is a silicate of lime and alumina, and is described as harder than granite. It will take a high polish, and is shown in several slabs. The ground is white mottled with pink of various shades. Tiles are shown by a number of nations. Japan, Germany, and France send a few, but those from the first two countries are insignificant, though the German art tiles in the Manufactures Building are sufficiently numerous in point of numbers. England is well represented in this department, but these exhibits scarcely come under the head of building materials as we are studying them, and they may, therefore, be neglected for the present.

The department of building materials would be scandalously small and insignificant were it not for the American collections. These are housed chiefly in the Mines and Mining Building, though several of the States make individual displays in their own State buildings. The collections are arranged under two general heads. A comprehensive collection of the building stones of the United States, formed under the direction of the Department of Mines, Mining, and Metallurgy of the Exhibition, has been placed in the gallery of the Mines and Mining Building. It forms a collection distinct in itself. The second division under which these exhibits may be conveniently classed, is composed of the State exhibits, housed in the same structure, and placed on the main floor. In addition to these two chief divisions, a third might be said to include exhibits made by individual exhibitors. These are few in number, and the exhibits are of minor importance.

The general collection, formed under the direction of the Exhibition authorities, is very complete and very good in its way. The specimens are of uniform size, polished wherever possible or necessary to show their constructive value, neatly arranged, and labelled with their names, common and technical, source of origin, name of person contributing the specimen, and similar data. This, of course, is highly interesting and of considerable importance, but it is very far from affording any satisfactory information to the architect. There is nothing whereby one can learn the physical properties of the stones, or which would enable one to determine which of two similar stones he would use for some specific building work. In other words, while this collection has been made as a collection of building stones, with their economic value stricly in view, and has been formed with the idea of illustrating the entire stone products of the United States, it contains absolutely nothing that would make it of practical value to the architect or builder. It is simply so many cubes of variously-coloured stones, marked with their individual names and localities, very pretty to look at, very complete so far as generally covering the country is concerned, but absolutely worthless, in its present shape, for practical study. A fair collection of marbles, granites, &c., are also shown by the Ward Natural Science Establishment of Rochester, New York, arranged for schools.

A strange fatality follows the architectural exhibits in every department. The Exhibition authorities are giving special attention to the subject of coal, carrying on extensive experiments and preparing tabulated results of their work, which will be of the utmost value in the future development of the coal industry in America. Other collective exhibits in the Department of Mines, mining and metallury are similarly useful or self-explanatory, owing to the thoroughness with which the exhibits have been formed. But architecture and the subjects dependent on it sadly feel the want of an administrative mind which should turn such exhibits as may be complete, as that of building stones is to a considerable extent, to some practical value. A brief handbook, giving some technical information as to the building stones of the United States, with special reference to the present collection, would have been of the utmost value, and would have enabled the immense resources of America in this field to be appreciated and understood by those interested in the subject.

Downstairs on the main floor things are little better. The larger part of the American section of the Mines and Mining Building is taken up with displays of the resources of the different States, prepared under the direction of the various State commissions. There are thus very few individual exhibitors, a circumstance not in the least to be regretted, since most of the State displays are fairly complete, and illustrate the mineral products much better than had the matter been left to chance exhibitors who would have sent such goods as they were placing upon the market, without a thought of illustrating State products. In this respect, therefore, the Mines and Mining Building is one of the most interesting in the Exhibition, since it is one of the few in which some attempt has been made to prepare comprehensive exhibits with special reference to the subject as a whole, whatever its individual bearings may be. Building stones are, of course, but a single one of the many features shown by the States, mineral products and ores occupying the most space; but they nevertheless form a good part of the displays, and, taken as a whole, they make a very effective illustration of the great and abundant resources of the America.

(To be Continued.)

REPAVING THE STRAND.—We are informed that the "Wells Light" is being used by the St. Martin's Vestry in connexion with the work of repaving the Strand from Trafalgar-square to Burleigh-street. It is now some four years since this part of the Strand was paved, and it then took nearly two months, but Mr. Mason, the Vestry Surveyor, has undertaken to complete the work in three weeks.

THE COLOUR OF WALLPAPER AND THE STRENGTH OF ILLUMINANTS.—According to the Copenhagen *Dagblad*, Dr. Sungmer, physicist, has made some interesting experiments with respect to the effect of the colour of wallpaper on the strength of gas-light. As unit he chose the intensity of the illuminant in a room entirely covered in black, and equal to 100 candle-power. The corresponding figures were:—Dark brown paper, 87 candle-power; unstained wood, 80; blue paper, 72; light yellow oil colour, 60; yellow-grey paper, 20; and for whitewash, 15 candle-power. The figures should, therefore, indicate that in a whitewashed room the same amount of light would be obtained from a jet of gas as in one covered with brown paper, with only one-fourth part of the consumption.

MR. FAIJA ON PORTLAND CEMENT.

WE extract the following from the paper on Portland Cement read by Mr. H. Faija at the International Engineering Congress in connexion with the Chicago Exhibition in the first week of August:—

"The economical grinding of cement has lately attracted the attention of a great number of inventors, and mills or grinding machines of almost every conceivable design and principle have been patented, but whether any of these will survive and eventually supersede millstones is a very problematical matter. The two principles which have perhaps attracted the greatest attention are those of edge-runners and ball mills, and the economy in power by both these principles over ordinary millstones is very considerable, and the cost of repairs and maintenance is also, in most cases, considerably reduced; but whether the grinding is as efficient is another question altogether. Mere fineness does not satisfy the question, as a cement may be ground to an equal fineness in two different mills, and yet one will be all grit and the other all flour; and the more floury nature a cement is, the better will be the results obtained with it, both in the testing room and in actual practice; and undoubtedly no grinding machine that has as yet been invented will produce the same percentage of flour on equal grinding as the ordinary millstone. Mills on the ball principle give better results than those on the edge-runner principle, but are not so efficient as millstones.

The power consumed by the several principles, reduced to the production of one ton of cement per hour, may be approximately stated to be as follows:—

For millstones ...30 to 32 i.h.p. per ton per hour.
Ball principle ...16 to 18 i.h.p. per ton per hour.
Edge-runner principle .....12 to 14 i.h.p. per ton per hour.

In each case the cement being ground to a fineness of about 5 per cent. residue on a 50 by 50 sieve, and it will thus be seen that the power required is proportionate to the amount of flour produced.

The great objection to millstones, from a manufacturer's point of view, is the great expense entailed in dressing them, as in a hurst of four pairs of stones, one pair will always have to be up being dressed, and there is therefore, not only the expense of dressing, but there is the increased capital charge in requiring four mills to do the work of three. It seems possible, though the author has not had the opportunity of trying it, that by giving the millstones a fine dress with a considerable depth of face, the first grinding of the cement might be effected in one or other of the grinding machines and finished only in the millstones.

Before leaving the subject of the manufacture of cement, the author would like to point out to manufacturers, or intending manufacturers, the necessity and great advantages of having ample warehouse room for the finished cement. Very few cements are fit for use immediately they are ground, and all cements are improved by judicious and careful warehousing. Not only, therefore, is a manufacture improved by having ample warehouse room, but ample warehouse room enables the manufacturer to continue manufacturing his full output, even when his sales may for the moment be a little slack.

* * * *

One of the peculiarities of Portland cement is, that if its components are improperly proportioned, or its manufacture has not been properly carried out, it may have a tendency after being gauged and mixed with water, to crack, expand, or disintegrate and fall into powder. This peculiarity is known under the cognomen of 'blowing,' and when a cement is said to 'blow' or to be a 'blowey cement,' it means that after the cement has been used it expands, cracks, or disintegrates, destroying the work in which it has been used.

The cracks, however, which are seen in concrete work are not always due to the use of a 'blowey cement,' but may be due to constructional causes, or to the expansion and contraction of the structure due to variations in temperature, or to the natural contraction of the mass: and a simple crack in a piece of concrete would hardly be indicative of a 'blowey cement' unless accompanied by other indications such as friability or absolute disintegration.

Concrete or mortar, again, may disintegrate, crack, and fall to pieces from other causes than the use of a 'blowey cement.' There are certain matters often present in aggregates which, by not allowing the cement to set properly, are antagonistic to the production of a sound concrete or mortar: the principal of these are dirt and loam, and there is no doubt in numerous instances the cement has been blamed when the real fault has been either that the aggregate with which it was used was dirty or unsuitable, or that the concrete or mortar had been improperly manipulated; and a user of cement should be as careful in his choice of aggregate, sand, and water as he is in his choice of cement. The best aggregates are those which, while having ample strength, are somewhat irregular in form, and slightly porous, and which has been carefully and thoroughly washed before being used. The scope of this paper, however, does not extend to the choice of agggregates and the manufacture of concrete, but as these, if improperly selected and manipulated, may cause a failure, irrespective of the quality of the cement, it seemed necessary to allude to the subject.

Returning, however, to the subject, a cement may blow within a few hours of its being gauged, or it may not blow until several months afterwards. A cement may blow when it is very fresh and newly ground, and will lose that tendency after it has become aged. Some cements will blow whether they are new or old.

The cause of 'blowing' in a cement is generally due to an excess of lime in its composition, or to an imperfect combination of the lime with the silica and alumina. It may, however, be due to other causes, as for instance, to the presence of other basic materials unduly entering into the composition of the cement by the use of improper raw materials. One of these, magnesia, created a considerable scare a few years ago. Sulphate of lime or gypsum is another, which although it has not attracted the attention of users like magnesia, is more often found in cements, and when in any considerable quantity, undoubtedly has a very great power of rendering a cement blowey. As previously stated, it is hardly fair to the user that he should be required to make himself *au fait* on the several causes which constitute a blowey cement, it should be enough for him to determine, and be able to ascertain whether or no a cement is blowey, and leave it to the manufacturer to properly compound the cement, and correct his manufacture.

Several means have from time to time been devised for ascertaining within the limits of time of an ordinary test whether or no a cement is absolutely sound, and that process or test which was devised by the author some fourteen years ago is now in general use. The apparatus in which the test is carried out, and the means of carrying out the test, are fully described in the Proceedings of the American Society of Civil Engineers, Vol. XVII., November, 1887, in a paper which the author had the honour of communicating to that Society, headed "Portland Cement Testing." Briefly, it is a vessel containing water, the water being maintained at an even temperature of about 110 deg. to 115 deg. Fahr.; there is a cover to the vessel so that above the water there is a moist atmosphere which has a temperature of about 100 deg. Fahr.

The manner of carrying out the test is by making a pat on a small piece of glass; immediately the pat is gauged it is placed on a rack in the upper part of the vessel, and is there acted upon by the warm vapour rising from the hot water; when the pat is set quite hard it is taken off the rack and put bodily into the water, which, as has already been stated, is maintained at a temperature of from 110 deg. to 115 deg. Fahr., and in the course of twenty-four hours it is taken out and examined, and if found then to be quite hard and firmly attached to the glass, the cement may at once be pronounced sound and perfectly safe to use; if, however, the pat has come off the glass and shows cracks or friability on the edges, or is much curved on the under side, it may at once be decided that the cement in its present condition is not fit for use; the blowing however may only be due to the extreme freshness of the sample, and though a cement in its fresh condition is unfit to use, it may be a perfectly good cement when aged, and in order that a cement should not be condemned unjustly it is advisable, in the event of a cement showing a tendency to blow on the first experiment, to lay some of it out in a very thin layer on a tray, so that it may be thoroughly cooled, and in the course of a few days another pat should be made and treated in a similar manner; if this pat goes through the ordeal successfully, and is perfectly sound, it may be fairly assumed that the cement only requires ageing to be a perfectly useful one, if on the other hand the second test proves unsatisfactory, it would not be advisable to use the cement. A cement may show indications of blowing while it is on the rack in the moist heat of the vessel; if this happens it is needless to say that no corroborative test is required, the cement must be absolutely worthless.

The ordinary practice of carrying out this test, is to make the pats in the morning, at say ten or eleven o'clock, and to place them in the upper part of the vessel, and before leaving in the afternoon, say at 5 o'clock, to put them in the water underneath, and to examine them for soundness the next morning, so that in twenty-four hours after the receipt of a sample its soundness may be known; and the author feels sure that both users and manufacturers will agree with him in the importance and value of the test.

It is hardly possible to dismiss the subject of the soundness of cement, without reverting to a test that was suggested some three years ago by M. Deval, and which was reported upon by M. De Chatelaine, and known as the "hot test." It consisted in gauging briquettes in the ordinary way, either neat or with sand, and when they were set, placing them in water which was kept at a temperature of 80 deg. C. (*i.e.*, about 177 deg. Fahr.), and it was maintained that by so treating a briquette, the strength due to twenty-eight days, as carried out in the ordinary way, was attained by this method in considerably less time, and thereby the constructive value of a cement could be more quickly ascertained. It was also maintained that this treatment of a cement determined whether it was a sound cement or not, for if the briquettes did not stand this excessive temperature but cracked or became soft, then it was asserted that the cement was an unsound one.

When the author devised his apparatus for determining the soundness of a cement, which has already been described, he naturally had to make a great number of experiments before deciding on a temperature which it was advisable to adopt, and he then found that although some cements would bear being almost boiled, many cements that were in every respect good and sound cements would not stand the moist atmosphere, and subsequent warm bath if the temperature was higher than that which he adopts, viz:—116 deg. Fahr. for the bath; he therefore, when M. Deval's test was made public, made a long series of experiments to satisfy himself that he had made no false deduction in his previous experiments. The conclusion which he had arrived at after these experiments with the "hot test" were the following:—

1.—That if a cement was really blowey his own apparatus showed it equally with the hot test.
2.—That the induration of a good cement was hastened as much, and sometimes more, by immersing the briquettes in water maintained at the comparatively low temperature of 116 deg. Fahr., as when immersed in a bath at the enormous temperature of 177 deg. Fahr.
3.—That no 'fully' limed as distinguished from 'over' limed cements would withstand the 'hot test,' but that all fully, or over-clayed cements would stand it, and that consequently the test acted prejudiciously to what is accepted as a good cement, and gave preference to the over-clayed and quick-setting ones.
4.—That nearly any cement that had been aged sufficiently would stand the hot test.

As the result of these experiments the author came to the conclusion that the hot test could hardly be considered a satisfactory test, and as the test has not made any great headway with either users or manufacturers, it seems that the conclusion he arrived at was fully justified."

SANITARY CLASSES, YORKSHIRE COLLEGE, LEEDS. — We have received the prospectus of the lectures and classes formed at this college for the teaching of Sanitary Engineering on the most advanced lines. Mr. Spinks, A.M.Inst.C.E., is the lecturer, and courses of lectures are delivered, not only at the college, but at various centres, the lectures being delivered free, and the local expenses only being paid by the locality. The subjects on which instruction is given are classed under Hydraulics and Water Supply, Road-making, Town Sewerage Works, and Home Sanitation.

TYRES'S PATENT POSTAL TUBE.—This tube, manufactured by the Government Postal Tube Company, has a slit or eylet near one end sufficiently large to enable the finger and thumb to grasp a drawing or photograph enclosed in the tube, and draw it out without injuring it. Photographs are not infrequently injured in extracting them from the tube of the ordinary pattern, and the improvement is a useful one.

Illustrations.

ROYAL UNITED SERVICE INSTITUTION.

THIS drawing, which was exhibited at the Royal Academy of the present year, represents the front of the new building adjoining the Banqueting Hall on a large scale, and in a more front view than the smaller drawing which we published on May 13.

We gave with that publication a description and plans of the building, of which Messrs. Aston Webb & E. Ingress Bell are the architects.

COURTYARD OF NEW HOUSE AND STUDIO.

THIS is a view of the courtyard formed within the buildings for a house and studio which are being carried out for a well-known sculptor, from the designs and under the superintendence of Mr. Howard Ince. The small plan attached to the drawing shows sufficiently the general arrangement of house and studio, the scheme of which is pretty obvious without the labelling of the rooms. In the original drawing, which we commented on when noticing the drawings in the Architectural Room of the Royal Academy, the lower portion of the wall facing the spectator up to the string-course, is shown of a warm reddish tint, the part above the string being white, thus giving a quiet variation in colour (one can hardly say polychromy, which adds to the individual character of the building. The house gateway placed diagonally, with the colonnettes surmounted by figures, is a very pretty incident, and the general appearance of the building, though quiet and unpretending, conveys the idea of its being the home of an artist.

DESIGN FOR A BOOK-COVER.

THIS design, by Mr. Rowland G. Jones, was exhibited in the Architectural Room at the Royal Academy this year.

It is intended for a cloth binding, gold on dark blue, some of the detail and title being relieved with a dark red ground, the border in grey.

PROPOSED HOUSE, LLANDAFF.

THESE are illustrations of the entrance and garden fronts of a house proposed to be built at Llandaff. The plan was arranged so that a billiard-room and a swimming-bath, with bedrooms over, could be added at a future date to the west side of the house, with entrance from the hall.

The walls up to the first floor level are shown to be faced with red brick, with stone quoins and sills, the first floor walls being hung with tiles and half timber work. The whole of the woodwork would be stained dark brown, and the roofs would be tiled.

The drawings are by the architect, Mr. R. A. Briggs.

AN ALBERT DÜRER WINDOW, FAIRFORD.

THIS illustration is taken from another of Miss Emma Knight's admirable water-colour drawings of the windows at Fairford Church, the design of which is commonly attributed to Albert Dürer, another of which was published in our pages a year or two since.

The subject of this three-light window belongs to the interval between the death and resurrection of Christ. The taking down from the Cross is shown in the left-hand compartment, in the centre light is "The Entombment," and on the right is Christ preaching to the spirits in prison. Above is a combat between angels and evil spirits. Below Adam and Eve, the first transgressors, are being set free. The most remarkable point in the design is the agonised face of the spirit behind the grating in the rear, one of the "spirits in prison" who are not freed; one of the many instances of the intensity of feeling with which the artist, whether Dürer or an unknown Mediæval painter, endeavoured to realise his subject.

SHEFFIELD MUNICIPAL BUILDINGS.—The contract for the marble wall lining, &c., to hall and corridors, at the new Municipal-buildings, Sheffield (Mr. E. W. Mountford, architect), has been secured by Messrs. J. & H. Patteson, of Manchester.

THE ARCHITECTURAL ASSOCIATION SUMMER VISITS.

COLCHESTER, LAYER MARNEY, AND COPFORD.

A COMPARATIVELY small number of members went on Saturday last, under the guidance of Mr. Francis Hooper and Mr. Arnold Mitchell, to spend a day in Essex. Colchester was first visited, rich in Roman remains, whether it be the Camalodunum of Roman writers or not. Camalodunum or Colonia, or Colchester, was, as is clearly evident from the many and important remains of Roman art which have been disinterred, a settlement of very high importance. Large quantities of Roman tiles are to be seen in several of the old buildings of Colchester, in the Castle and St. Botolph's Priory especially.

The history of Colchester is of considerable interest, from the time when, as the Caer Colun of the Britons, it was a town of considerable importance before the Roman occupation, and various points of historical interest were noted by the visitors.

An inspection was first made of the ruins of St. Botolph's Priory, with their curious construction of Norman work in rubble stone and Roman brick, while the absence of dressed stone, except at the west doorway, suggested that stucco must have been the material in which the architectural dressings were executed, a supposition supported by the existence of some remains of plastering, evidently of very early date, still to be seen. No authentic records of its erection exist, but appearances seem to indicate that the building was erected between 1120 and 1150.

Next a visit was paid to the Castle, now occupied as a museum, while the grounds are laid out as a public park. The original Roman Castle was largely repaired by Edward the Elder, and is a fine monument of Saxon and Norman work, with some of the finest herring-bone work in existence, and Roman bricks of remarkable size. The castle has stood many a siege, being taken by King John from the garrison of Saher de Quincy, Earl of Winchester, and by King Louis of France, and the barons, time after time. Its last siege was in 1648, when it was gallantly defended by the Earl of Norwich, Lord Capel, Sir Charles Lucas, and Sir George Lisle for eleven weeks against the Parliamentary forces under Fairfax, to whom, however, it was finally surrendered, when the captains Sir Charles Lucas and Sir George de Lisle were shot under the castle walls, as is commemorated by an obelisk on the north side of the park.

In the museum the visitors were shown the famous Colchester vase, with the contained ashes of the gladiator whose most notable exploits are vividly depicted on the exterior. Many other fine specimens of Roman work were also seen, as well as a specimen of the baize, for the production of which Colchester was formerly noted, and which was manufactured there, and in the neighbouring towns and villages of Constable's country. Specimens of this baize are now very rare, although there are still living those who have assisted in the industry introduced by the Flemings in the reign of Elizabeth, but now quite extinct.

A visit was made to the church of St. Peter's, an ancient structure, erected before the Conquest and noticed in Domesday Book as the only church then existing in Colchester, and then, after lunch the party drove to Layer Marney, to see the interesting mansion and church, which have already been described in the *Builder*. Leaving Layer Marney, the party next drove to Copford Church, where they were met by the rector, the reverend Benjamin Ruck-Keene, under whose guidance they inspected the church with its little-known, but very remarkable series of mural paintings of eleventh and thirteenth-century date. These were for many years covered with whitewash, and the modern resuscitation was prompted by the account in Wright's History of Essex, "That about the year 1690 A.D. Copford Church was restored at the charge of the parishoners, and that, upon scraping the walls in order to be whitewashed, there appeared very fair and fresh paintings of 'Christ upon the Cross,' 'St. Peter's mother-in-law lying sick of a fever,' of 'Mary Magdalene,' and other representations, which were all whited over again but not otherwise injured." In the search for these paintings, the whitewash was, in 1872, scraped off the interior of the apse, and the interesting paintings of this part of the church were discovered, though the subjects mentioned in Wright's History were not then found. The paintings of the apse were recoloured by Mr. Daniel Bell, literally and exactly

The paintings of the apse were clearly of two distinct dates, those on the vault being of that Byzantine character seen in some of the Rhenish Romanesque churches, such as Schwarz Rheindorf, and in much of the early French glass. It is generally supposed that an exodus of artist monks from Constantinope about the middle of the twelve century introduced into Western Europe the art of Byzantium, of which the apse of Copford Church is one of the evidences. The paintings of the apse represent in the centre a Majesty, with a vesica surrounding the figure of our Lord, who is represented as holding a book in His left hand, the right, with two fingers raised, giving the benediction. Around the central Majesty are angels, and behind them the remains of many towers, signifying, probably, the New Jerusalem. On the splay of the east window was discovered the figure of an angel treading on a serpent, doubtless St. Michael, and another angel opposite, possibly St. Gabriel.

Around the walls of the apse are the figures of St. Thomas, St. John, St. Peter, St. James, St. Simon, St. Paul, St. Andrew, St. Philip, St. Matthew, and St. Bartholomew, but these are clearly later than the paintings of the vault.

Of the paintings in the nave, one of the most interesting is that on the south wall, at the end nearest the chancel, which appears to represent King Stephen receiving the Eucharist at the hands of angels. Others represent our Lord's flight from Bethlehem, the contest of Samson with the lion, and, in the finest untouched original mural painting in the church, the story of the Centurion's servant, which is doubtless that referred to in Wright's History as the healing of St. Peter's mother-in-law. These do not exhaust the list of paintings in one of the most remarkable series of early wall decoration extant in England.

The church, apart from its decoration, is far from lacking interest. The structure itself, of flint, stone, and Roman tile, is a remarkable piece of Norman construction, while the clear evidence of the existence of a residence over the original vaulting of the nave is very remarkable. The chancel screen is an admirable example of the work of the end of the fourteenth or beginning of the fifteenth century, but has suffered somewhat from the coarse and incongruous additions of cornice and buttresses, added when the church was restored. One of the nave arches, inserted probably when the aisle was erected in the fourteenth century, is a fine example of early Essex brickwork, with its small bricks and very wide mortar joints forming a very pleasing piece of constructive and decorative design. The door now placed to the north entrance of the church is of very ancient date, with good ironwork, and was originally covered with skin, which is said to be that of a Dane, and is, from microscopical examination, pronounced to be either that of a pig or of a human being.

The visit to the highly interesting church of Copford completed the work of a remarkably enjoyable day, and the party then returned to town from Marks Tey Station, which, for the benefit of those who desire to see Copford, we may mention is the nearest point to that church.

LAUNDRY EXHIBITION.

AN exhibition of laundry machinery and accessories required for washing was opened on Monday at the Agricultural Hall, Islington. Like several recent exhibitions at the Agricultural Hall, the present one was far from complete on the day of opening, but so far as an opinion could be formed under these circumstances, the exhibition is a very representative and interesting one. A large number of machines for washing, ironing, &c., clothes, and for ventilating laundries and other buildings are exhibited, and altogether about 100 firms are represented.

Amongst the exhibits of special interest to our readers is a large apparatus, exhibited by Messrs. Doulton & Co., of Lambeth, for softening water, which is capable of softening 500 gals. of water per hour. The apparatus exhibited is used chiefly for laundry purposes, but it is adaptable for manufacturing and household purposes generally. It has for its object the prevention of incrustation in boilers, and the obviation of temporary and permanent hardness in water. Water is conveyed to a tank at the top of the apparatus and a softening re-agent, lime, is mixed with it. It then flows into a second tank where it is mixed with the water to be softened, in the proportion of one of the re-agent to six of the water to be softened. Precipitation then commences and goes on over and under a series of "baffle plates," which retard the process until the necessary chemical action has taken place and the water

has been made soft. The process is completed by passing the water through a filter. It is claimed for the apparatus that it requires but little attention, and is therefore almost automatic in action.

The Blackman Ventilating Company, Limited, in addition to their patent air propeller, exhibit a model drying closet, which is suitable for drying timber, leather, &c., as well as clothes. A continuous current of hot dry air is employed, which may be alternately used to dry clothes or timber in one apartment while work is being carried on in another.

Messrs. Baird, Thompson & Co., of Queen Victoria-street, exhibit a large assortment of their ventilating appliances, and they show their patent air propellor, which, judging from the model exhibited and in working order, is a very effective fan. The same firm also show an improved compressed air engine combined with the "Grahtryx" air nozzle, the object of which is to provide for the proper distribution of air in any large building. The compressed air is conveyed by a small pipe into a flue or funnel, where it is allowed to escape through an air nozzle, inducing movement in the adjacent air. The system is applicable both for withdrawing foul air and admitting fresh air, inasmuch as the nozzles can be reversed.

Messrs. Aland & Co., of Commercial-road, and Messrs. J. H. Pickup & Co., of Queen Victoria-street, exhibit their air propellers; and Messrs A. W. Kershaw & Co., of Lancaster, show various forms of their pneumatic ventilators and their inlet and air diffusers.

Messrs. Sam. Deards & Co., of Elden-street, E.C., show a model roof, glazed without putty, paint, or glue, and the "Little Samson" hot-water heating apparatus.

Messrs. Thwaites Bros., of Bradford, exhibit a water-softening apparatus (Andrew Howatson's patent); and amongst several other useful exhibits we may mention one by Messrs. Isaac Braithwaite & Son, of Kendal and London, which consists of an elastic steel door-mat, made of flat steel strips.

We may add that a model laundry, in full working order, is shown, and also that the exhibition, which closes on the 23rd inst., is to be an annual affair.

THE TRADES UNION CONGRESS.

WE continue our notes of the proceedings of the Trades Union Congress, which terminated on Saturday last.

Employers' Liability Bill.

On Wednesday in last week Mr. E. Harford moved the following resolution:—

"That this Congress heartily approves of the Employers' Liability Bill now before Parliament, containing as it does the principal points for which it has contended for years, amongst the most important of these being the provision against contracting out of the Act, without which no measure will be acceptable to the organised workers of the kingdom."

Mr. Andrew Clark (Railway Workers) seconded the motion.

Mr. Henry Broadhurst congratulated the Labour Members on the fact that the Bill for which they had contended since 1876 was now so near being passed into law. He hoped that the Parliamentary Committee would not permit any contracting out of the Bill whatever.

Mr. Pickard (London) referred to the builders' labourers as a class to whom the Bill would be most valuable.

Mr. John Burns, M.P., said there was one point—the liability of the sub-contractor, which was omitted from the Bill, but if this were dealt with they would have about as good a Bill as could possibly be.

Mr. Freck (London) moved:—

"That the Parliamentary Committee be instructed to use their influence to get a clause in the Employers' Liability Bill to the effect that where the plaintiff has to carry on an action for damages against a defendant and the case is defended by a third party—an insurance company or agent—the plaintiff to have the right (in the event of his getting a verdict for damages) to sue the company or agent if same be not paid."

Mr. J. E. Collins (London) seconded the resolution, which was rejected by a large majority.

The Chairman then put the resolution upon Employers' Liability, as moved by Mr. Harford and amended by the Congress, and it was carried almost unanimously.

The Eight Hours Question.

On Thursday a long debate took place on this question.

Mr. Ben Tillett moved the following resolution:—

"That the Parliamentary Committee promote a Bill gulating the hours of labour to eight per day, or forty-eight per week, in all trades and occupations, which Bill should contain a clause enabling the organised members of any trade or occupation, protesting by ballot against the same, to exempt such trade or occupation from its provisions."

He said that the resolution established the principal of scientifically adjusting the efficient energy of the worker to the need of the trade. It abolished overtime which, whenever practised, tended to lower wages for the day's work proper. It conduced to more regular employment, and tended to ensure for a greater number steady employment. It increased the pay for the average day's work. It ensured to the worker the contemporaneous and co-equal advantages of improvement in industrial methods, whether by the introduction of more effectual trading or increased industrial facilities. It determined a period of each day for recreation, offering opportunity for education and participation in democratic government. It ensured better health for the community, as the physical tension necessitated by long hours ended with the physical deterioration of the race. It was the best insurance against strikes. The standard of efficiency was greatest in those communities whose average day's labour was restricted to short hours, and the highest standard of wages and living conditions existed in those countries where the fewest hours constituted a day's labour.

Mr. Keir Hardie, M.P., seconded, and the motion was carried by 97 votes to 18.

Enginemen's Qualifications.

Mr. John Anderson moved:—

"That this Congress again requests the Parliamentary Committee to take the necessary steps with a view to having a Bill re-introduced into Parliament making it compulsory whereby those in charge of engines and boilers must have the necessary qualifications for this most important class of industry, by it being made compulsory that certificates of competency should be produced, not only in the interests and safety of the public, but also of our public servants themselves, more especially at her Majesty's dockyards, where attempts have recently been made by the Admiralty to reduce the staff of qualified men and in many instances replaced engineers and engine-room artificers by others ignorant of such duties. The same practice has been resorted to in the mercantile marine, so that we not only run the risk of crippling our naval service, but also endangering the safety of the public at large. Also that the Parliamentary Committee be directed to request the Board of Trade to discountenance the employment of marine engineers on repairs to the vessel on which they are engaged, and on which spare engineers might find employment whilst in any port in the United Kingdom."

Mr. F. Crompton seconded the motion.

Mr. F. Thurston moved as an amendment, to delete all the words after "industry."

Mr. W. Muir seconded.

The amendment having been rejected, the resolution was ultimately adopted.

Mr. P. J. King next moved the following resolution:—

"That the Parliamentary Committee be instructed to insert a provision in the Bill introduced into the House of Commons enabling men attending boilers and chemical and copper works to obtain certificates of competency after giving evidence that they have worked in that capacity for a period of six months at any time previous to the passing of the Act."

Mr. McHugh seconded, and the resolution was agreed to.

Contractors and Sub-contracting.

Mr. M'Keown moved the following resolution:—

"That the Parliamentary Committee be instructed to urge upon the Government the necessity of abolishing all contractors and sub-contractors in their workshops, and that the labour be employed direct, and not through middlemen."

Mr. John Burns seconded, and the resolution was carried without a division.

Wages and Government Contracts.

On Friday the Congress continued its sitting.

Mr. Collins moved the following resolution, which took the place of six resolutions:—

"That, in the opinion of this Congress, the expression 'fair wages' in the House of Commons resolution of February 13, 1891, re Government contracts, should be interpreted and construed to mean the usual trade union rate paid, and conditions of employment in force in each trade in the locality in which any Government contract is executed for the time being. This Congress calls upon the Government to insist on such conditions being inserted in all their contracts that will compel contractors to pay trade union rate of wages, observe trade union conditions, discontinue the employment of juveniles to supplant competent adults, and to purchase all manufactured goods necessary for the carrying out of their contracts from only such firms that observe the same conditions. And, furthermore, that all contracts should be subject to a free and open competition; also the present rate of wages paid in Government workshops to labourers is insufficient and contrary to the principle of the resolution passed in Committee on fair wages; and this representative body of workmen urges the Government to at once put into force that resolution, and pay the same rate as is given by private firms, and to urge the necessity of abolishing all contractors and sub-contractors in their workshops, and that the labour be employed direct and not through middlemen, and, further, to discontinue the sale of any disused Government stores in such a condition that they can again be placed on the market to the detriment of the industrial classes. That the Parliamentary Committee be instructed to bring the foregoing under the notice of the Government."

Mr. Simmons seconded the resolution, which was agreed to.

Contract Labour.

On the proposition of Mr. Cronin, seconded by Mr. Vickers, it was resolved:—

"That the Parliamentary Committee proceed as quickly as possible to introduce a Bill into the House of Commons on the lines of the American Contract Labour Law, to make it illegal and punishable by imprisonment to contract with and import workmen from outside the United Kingdom to work in the United Kingdom during labour disputes, trade depressions, or while there is an unemployed class existing."

The Housing Question.

On Saturday the only other matter of special interest to our readers which came up for consideration was the following resolution, which was submitted by Mr. Uttley and agreed to:—

"That this Congress desires to emphasise the vital importance to all workers of securing wherever possible the adoption of the various Artisans' Dwellings Act by their respective local sanitary authorities, and strongly urges upon all trade unionists and reformers to make it one of their imperative questions in selecting or supporting candidates for such bodies. Furthermore, in the opinion of this Congress it should be compulsory on the part of all sanitary authorities that they shall supply wherever the need exists healthy artisans' dwellings at the lowest possible rents."

COMPETITIONS.

RESTORATION OF THE OLD PARISH CHURCH, ARBROATH.—The Committee of the Arbroath Town Council appointed with reference to the restoration of the Old Church met recently to consider the report by Mr. Hippolyte Blanc, A.R.S.A. Edinburgh, on the designs submitted for the restoration of the church by the following architects:—Messrs. Hay & Henderson, Edinburgh; John Starforth, Edinburgh; David Robertson, Edinburgh; John James Burnett, Glasgow; David M'Millan, Aberdeen; Carver & Symon, Arbroath; and Hugh Gavin, Arbroath. Mr. Blanc placed the designs by Mr. Burnett first; Messrs. Hay & Henderson, Edinburgh, second; Mr. David Robertson, Edinburgh, third; and Mr. Hugh Gavin, Arbroath, fourth. There are three premiums, two of 20*l.* and one of 10*l.* Ex-Bailie Cargill moved that the Committee approve of and adopt Mr. Blanc's report, and agree to lay it before the Town Council, with the recommendation that the design submitted by Mr. J. J. Burnett, architect, Glasgow, be accepted provisionally, and subject to its being found that the plan can be carried out at the specified cost; that it be remitted to the Committee to procure working plans and specifications, and to take in estimates for the execution of the work; and that in the meantime the award of premiums should be reserved. The motion was seconded by Provost Keith, and agreed to.—On the 4th inst. the Town Council had under consideration the report of the Committee, and after discussion it was, by 9 to 7, resolved to disapprove of the report, and to remit the whole matter for consideration by the Council in committee.

ARCHITECTURAL SOCIETIES.

DUNDEE INSTITUTE OF ARCHITECTURE, SCIENCE, AND ART.—The members of the Dundee Institute of Architecture, Science, and Art had an excursion on the 9th inst. to Kinfauns, Perth, &c. By permission of Mr. E. A. Stuart Gray, Kinfauns Castle was thrown open for inspection, and Mrs. Stuart Gray pointed out the objects of interest in the corridor, drawing-rooms, dining-room, library, and museum. Later the gardens were visited. A collection of pictures was viewed with much interest, and also a stained glass window of German origin, as well as the architectural designs within the castle and without. In Perth, St. John's (East) Church, which has been recently restored, was viewed with interest. Mr. G. P. K. Young gave a description of the historical and architectural points of interest in the building. Mr. Wyllie, the organist of the church, described the new electric Hope-Jones system on which the organ is now worked. Luncheon was served at the Royal George Hotel, and from there the party drove to Dupplin Castle by way of Cherrybank. By permission of the Earl of Kinnoull, Dupplin Castle was also open for inspection. Here, too, the hall, in which there is part of a valuable collection of china, was viewed. The drawing-room, dining-room, and

library were also visited, and a considerable time was spent in the extensive grounds. From Dupplin Castle the drive was by way of the picturesque ruin of Huntingtower, back to Perth General Station, whence Dundee was reached by train.

GLASGOW ARCHITECTURAL ASSOCIATION.—The usual monthly meeting of this Association was held in the rooms, 114, West Campbell-street, on the 5th inst. Three papers on "Architects of the Early Renaissance" were read by Messrs. John Arthur, William Blane, and Charles Davidson, who respectively discussed Brunelleschi of Italy, Philibert de Lorme of France, and Inigo Jones of England. It was noted that the Renaissance took place in Italy much earlier than in any other country, chiefly owing to the abundance of old Classic remains, and to the fact that the Gothic style had never taken so firm a hold on the Italians as on the more northern countries of Europe, where the new style developed slowly, passing through a period of transition. The principal buildings of each architect were described and illustrated at length, and an account was given of their characteristics and the influence they exerted by their works and writings. A short discussion took place, and at the close a hearty vote of thanks was awarded the essayists.

Books.

Essays on Rural Hygiene.—By GEORGE VIVIAN POORE, M.D., F.R.C.P. London: Longmans, Greene & Co., 1893.

THE author's name is in itself a guarantee that this book contains a great deal of valuable suggestion on the subject of which it treats. The title "Rural Hygiene" has been chosen, Dr. Poore tells us, "because it is only in places having a rural or semi-rural character that it is possible to be guided by scientific principles in our measures for the preservation of health and the prevention of disease." The book aims at leading us back, in fact, to first principles. Unfortunately this effort seems to lead the author to some rather Utopian positions. He wants in fact to put a stop to large towns altogether, and asks with seeming naïveté why people should wish to crowd into them. We fear it is a good deal too late in the day for that, although we have long been of opinion that the enormous concentration into London must before long bring about a reaction as far as the capital is concerned. But we think Dr. Poore is unfair and needlessly pessimistic when he affirms that "if a so-called sanitary measure seems likely to increase the rateable value of a district for the time being, that is generally regarded as sufficient ground for bringing it into action." We are of opinion that most of the sanitary legislation which has been carried out in towns of late years has been initiated with an honest desire to improve the hygienic condition of the districts concerned; and surely the fact that it does increase the rateable value of property may be taken as an indication that it is recognised as effecting such improvement.

Dr. Poore makes a dead set at the water-carriage system of removing fœcal matter, in other words, at the water-closet, and contends that it has been the source of much disease, of poisoning our rivers, &c., and that it is absolutely unnecessary; that wherever there is a small garden (in which an earth-closet can be placed) all the elaboration connected with water-closets and drainage is unnecessary. The difficulty of the problem of dealing with the enormous aggregate of sewage created by the water system we should be the last to underrate, but Dr. Poore seems to ignore other difficulties which cannot be overlooked. It must be admitted that an earth-closet is a thing we cannot have within a house, and he evidently considers that all such offices should be outside of and unconnected with the dwelling house. There is a great deal to be said for that provided we were all people in rude health; but it is surprising to us that a medical man should absolutely overlook the hardship and even serious danger to sickly and infirm people which must arise from their being compelled to go out into the open air to an earth-closet in any weather, however inclement, perhaps even at night. It appears to us that such a system is an absolutely impracticable one for general use on a large scale and in cities, and as far as we remember it has proved a failure and been abandoned wherever it has been tried as a general system. The conditions of civilised life necessitate the provision of the closet within the habitation, though we entirely agree with the author that more special means ought to be taken to isolate it from the rest of the dwelling in the same way in which it is isolated in hospitals, and that almost all houses in the present day are defectively planned in this respect. But to go back to the earth closet in the garden is simply going back a step, and a very serious one, in comfort and civilisation; and Dr. Poore appears, in making his case against the water-closet, to emphasise and exaggerate all its disadvantages and to shut his eyes to all the disadvantages and discomforts which must attend on the alternative system.

The remarks on the common defects in the planning and construction of hotels should be studied by all concerned, especially in regard to the frequent bad planning of the bedrooms, long rooms with a window at one end, and also the lack of quiet and in some sense of privacy arising from the employment of thin walls and partitions where there should be solid partition walls. The system of building ranges of rooms with intercommunicating doors to allow of their being thrown into suites as may be required is a most barbarous one, and ought not to be allowed. Suites should be planned and built as suites, and separate rooms as permanently separate rooms. Of course also, as a matter of sanitary condition, we quite agree with the author in condemning the great height of the modern class of hotel, in towns especially, which simply means that more persons are congregated in the space than ought to be; and the same applies to the increasingly prevalent system of lofty blocks of "flats" and of "model" workmen's dwellings, in which people are merely overcrowded vertically in place of being overcrowded horizontally; in fact the objection is much stronger in these cases than in that of hotels, as people live in them all the year round, while, in general, the same people only spend a few days in the overcrowded hotel.

We are glad to find Dr. Poore urging that one of the reforms most urgently needed is the supply of water by meter. We have no doubt that this is bound to come before long, for it is impossible that public opinion can long tolerate the present inequitable system of water-rating and the concomitant petty tyranny and abuse of their powers by water companies.

In treating of the important question of burial, Dr. Poore is strongly opposed to cremation and in favour of earth burial; and, as with the case of water-closets *versus* earth closets, it appears to us that he overlooks all the advantages of the method he condemns and all the drawbacks of the method he recommends. But he is to be thanked for drawing attention in strong terms to one drawback which must be inseparable from cremation if carried out on a large scale and as a generally adopted and recognised system, viz., the inevitable fouling of the air from the enormous amount of the products of combustion which must in that case be discharged into it. It is really amazing to us that the medical men and sanitarians who are recommending cremation as the one system should entirely ignore this probably very serious drawback attendant upon it.

Dr. Poore's book is the statement of sanitary faith of an able man with strong convictions; often, as it appears to us, one-sided and partial in his views, but always with something striking and forcible to say in support of them; and every one interested in sanitary subjects should read it.

A Treatise on Public Health and its Applications in different European Countries. By ALBERT PALMBERG. Translated from the French Edition and the section on England edited by ARTHUR NEWSHOLME, M.D. London: Swan Sonnenschein & Co.; New York: Macmillan & Co. 1893.

THIS is a work of some interest as giving a kind of comparative view of the state of sanitation in the principal European countries, commencing with England, to which a larger space is devoted than to any other country, the author, who is a Swede, recognising that England is ahead of all other European countries in sanitary appliances and sanitary legislation. There is nothing for anyone to learn from the English section; naturally we know more about our own doings in the way of sanitation than a foreigner can tell us; but it is satisfactory to find this country is given so good a record, and our sanitary appliances so fairly illustrated, within a limited space, in a book which has been circulated, as we are informed, in several languages.

From England we go to Belgium, where we learn that the sanitary legislation is in a very defective and antiquated condition, and greatly needs codification, there being no general Public Health Act for the kingdom. The Belgians are also much behind the English in their appreciation of the value of pure air, they have great fear of draughts in their houses, and "arrangements for admitting fresh air into a room are generally wanting. Chinks of windows and doors are closed to prevent catching cold." In recent school buildings, however, a central heating apparatus with an arrangement for introducing fresh air has come into use, but "is only available in winter." The Belgian water-closets are constructed on English models; not however the best or most advanced. In France there is a very complicated system of hygienic legislation, and it is rather in practical details than in general principles that we find deficiency. Some of the special French forms of traps and waterclosets, of which a good many are given, are indeed astounding enough to the mind of the English sanitarian. In the chapter on Germany we notice the illustration of the Leipzig system of closets with movable receptacles, which is reported as having proved unsatisfactory and a nuisance, and is being gradually abandoned in favour of water-closets.

Of the details of sanitation in Austria we do not learn very much from Herr Palmberg's pages, but the legislation in regulations with regard to hygiene seem to be far more satisfactory and systematic than in most European countries. In Sweden the hygienic legislation appears to be very full and satisfactory; the details of sanitary apparatus in that country are not much illustrated. Under the heading of Finland we notice a good stove known as "Andsten's," and the elaborate and scientifically devised means for warming railway carriages reminds us of one point at all events in which we are behindhand in England.

Of course so large a subject as international or European sanitation could not really be illustrated in detail except in a much larger work than this single volume of rather over 500 pages; but the book is sufficient to give a fair summary of the comparative state of sanitation in the principal European countries; and as all these matters are, it is to be hoped, in a state of progress, the labour of producing a larger work with fuller statistics would have been rather thrown away when we consider that the information must necessarily become to a great extent out of date in ten years or so. The book gives us a rapid general survey of the present state of things in Europe, and that is perhaps all that could be of much practical use. To study the details of sanitary appliances in various countries the reader must apply to the separate specialist publications of each country, and a list of these is given at the end of the book.

The Sanitary Inspector's Handbook. By ALBERT TAYLOR. London: H. K. Lewis. 1893.

THE author of this small book, which is dedicated to Professor Corfield, holds the position of Chief Sanitary Inspector to the Vestry of St. George, Hanover-square; and his practical experience no doubt qualifies him to act as adviser to younger men in the same profession as to the difficulties and the necessary routine of their duties. A good deal of it, dealing with the general subject of nuisances, is beyond our scope; but among the subjects treated of are house drainage, water-closets, waste-pipes, gullies, drain-testing, &c. There is little on these subjects, of course, that is not to be found in larger specialist treatises; the usefulness of the book consists in combining under one cover a summary of all the departments of a sanitary inspector's duties. It may be chiefly useful, we imagine, to those who are putting themselves in training for a sanitary inspector's position, as giving them a kind of summary of the scope of the duties which they have to train for.

Archæologia Oxoniensis. Supplement to Part II. English Architecture before the Conquest. By J. PARK HARRISON. H. Frowde: London and Oxford. 1893.

THIS is a further continuation of Mr. Harrison's interesting notes on Saxon architecture, with the view of establishing a closer connexion between it and Roman architecture than has been hitherto supposed for it by some critics, or so Mr. Harrison seems to imply. We do not ourselves understand that anyone with eyes in his head could question the classic relationship of many of the rude efforts at profiling in Saxon capitals, or of some of the ornament and carving of pre-Norman date; but if there are such, Mr. Harrison brings facts forward which should tend to convert them.

Griffin's Electrical Price Book. Edited by H. J. DOWSING, M.I.E.E., &c. London: Charles Griffin & Co. 1893.

MR. DOWSING has well performed a difficult task, and supplied, to use the stock expression, a long-felt want. Price lists of all electrical plant and accessories are given, and every pains seems to have been taken to secure accuracy. The book will be found useful, not only to the trade, but to anyone who contemplates an electric installation, not of course as a substitute for, but as a means of checking, the estimates received. Though the bulk of the volume is taken up by price lists, there are a few practical hints to be found here and there and occasional brief descriptions of processes and apparatus. The Phœnix Fire Office rules and Board of Trade Regulations are also included, and the volume closes with a few well-selected tables.

In a book of this kind the greatest difficulty must be in deciding what to omit. For our part we could best spare the specimen reports on the electrical supply of towns. Indeed we can hardly imagine why they were inserted, unless to give us an opportunity of comparing the respective styles of Mr. Crompton and Mr. Preece, or to create an impression in favour of the low-tension system.

Spon's Tables and Memoranda for Engineers. By J. T. HURST. London: E. F. &N. Spon. 1893.

THE appearance of the twelfth edition is sufficient in itself to prove the usefulness of this little book, which contains a large amount of information and formulæ compressed into a volume 2¾ in. long and 1¾ in. wide, thus being in the true practical sense a "pocket"-book.

The Soil in relation to Health. By H. A. MIERS, M.A., F.G.S., F.C.S., and R. CROSSKEY, M.A., D.P.H. London: Macmillan & Co. 1893.

THIS is an excellent little book, containing in a small compass a clear statement as to the influence on health of various dispositions and conditions of the coating of the globe we live on, expressed with scientific clearness and accuracy of definition, but in terms comprehensible to every educated reader. It is a strictly practical little book, well written, but with no wasted words. It is one which architects would find very useful as a brief guide in regard to the questions to be kept in mind and answered when determining the site for a dwelling house, and which may be of considerable use also to rural sanitary authorities in suggesting to them in what direction to look for some of the causes of unexplained disease.

Correspondence.

To the Editor of THE BUILDER.

MECHANICAL AND "AUTOMATIC" VENTILATION.

SIR,—I have lately come across several denunciations of the mechanical system of ventilation with special reference to schools, certain interested persons holding that the automatic system is much superior to it.

It is obvious that mechanical ventilation is comparatively somewhat expensive where the accommodation is small, but in large schools I hold there is no doubt whatever that mechanical ventilation is of great advantage from the points of view both of economy and of health; and I speak from the following experience:—

Along with the late Professor Carnelly, I first moved in the Dundee School Board for the introduction of mechanical ventilation into the new schools. I thus have had reason to watch the system, and after several years' trial, have had no cause whatever to change my opinion. Some schools are mechanically ventilated, others automatically ventilated; and all who pass from the one to the other can tell how much superior the former is to the latter. Her Majesty's Inspector of Schools has stated this several times in his reports; and the Building Superintendent, whom the Board employs from time to time as Architect, is of the same opinion. A retort might be made that the automatically ventilated schools have been badly engineered. I can hardly think this is the case, for various experiments have been made on the schools, and, further, Her Majesty's Inspector informs me that the mechanically ventilated schools in Dundee are better than any of the automatically ventilated ones in his district, which is a large one.

Objection has been taken to the cost of mechanical ventilation, which is about 1s. per head per annum, and we are told that automatic ventilation costs next to nothing. I have humbly to submit that experience in this district has shown that automatically-ventilated schools are inferior to mechanically-ventilated schools; that none of your readers have ever been in any long occupied building crowded as schools are, unless when almost all the windows could be opened, which has not been very close; whereas mechanically-ventilated buildings, if properly engineered as they are here, are comfortable and pleasant. With automatic ventilation, to have comparatively good air, there must be increased space. Now, the place of each child in school costs from 10s. to 15s. per annum in ground rent and interest on building. Mechanical ventilation costs 1s. per child per annum, and thus greatly superior atmospheric conditions are obtained at an increase of 7 to 10 per cent. To improve in any similar degree the atmospheric conditions of automatically-ventilated schools would mean immensely more than 7 or 10 per cent. increased space, and in addition the cost of heating would be increased. The complete satisfaction here, both as regards efficiency and economy, with the mechanical system of ventilation is shown in the fact that the Dundee School Board have during the last five years built a number of schools, and no motion has ever been made to put in automatic ventilation; mechanical ventilation is put in as a matter of course. If the automatic system is so good and so cheap, it surely would repay some of the inventors or promoters to put in simple installation in such a place as Dundee, receiving payment only if the ventilation were nearly as good as that of mechanically ventilated schools. I do not intend to enter into a controversy on the subject. I have given my experience, and sufficiently indicated where more information can be obtained if desired.

Balruddery, near Dundee. J. MARTIN WHITE.

The Student's Column.

GEOLOGY XII.

THE NATURE AND USES OF MAGNESIAN LIMESTONES.

NO rocks have evoked more interest or discussion amongst architects than those popularly called dolomites, or magnesian limestones. It is well-known that the Commissioners appointed to inquire into the building stones of this country with a view to the selection of a good material wherewith to build the Houses of Parliament, reported that of all the freestones examined by them none were more suitable for the purpose than the class now under notice. Amongst these they chose the stone from a particular quarry, but for reasons which it is not our present intention to discuss, that stone was used but very sparingly in the structure, and, as a fact, materials from other quarries were entirely substituted therefor shortly after the building commenced. Before the edifice was finished the stone had already begun to decay, and to such an extent that another inquiry was officially held to review the matter, and to suggest remedial measures. This attracted considerable attention at the time, and no wonder that the scientific methods adopted in selecting stone for building purposes were publicly held up to derision. The official inquiry, however, completely dispelled the popular belief in this respect, and it was clearly ascertained that the stone recommended by the Commissioners, in so far as it had been used in the structure, had not succumbed in the slightest degree to the influences of the weather; the stone which had decayed so badly, and which formed the real fabric of the building, especially in that part facing the river Thames, was not that recommended by the Commission. Why the inferior stone should have been used is not very apparent on casual examination, though a tolerably accurate idea may be derived from a careful perusal of the minutes of evidence of the second inquiry alluded to: we would rather not go further into the matter.

From an architect's point of view, the inquiries just referred to have had a peculiar effect in determining the suitability of magnesian limestones for building purposes. After the first Report was issued, the members of the profession naturally became staunch believers in the durability of dolomites; but this belief received a severe check when it was known how the stone in the Houses of Parliament was faring; so deep rooted did the conviction of the worthlessness of the material for building purposes become that a considerable amount of prejudice against magnesian limestones has survived even to the present day. This will no doubt in time be removed as it becomes to be more generally recognised that good and bad varieties of all classes of building stone exist in Nature, and that careful selection at the quarry by competent and disinterested persons is the prime factor in ensuring durability with comparative facility of dressing. Moreover, the scientific methods of selecting building stone have vastly improved during the past ten years.

After this short digression we may turn to the origin, structure, and composition of dolomite.* The rocks usually known by that name found in England should, strictly speaking, not be called dolomites, as they are unlike the crystalline material occurring over vast areas in the Eastern Alps, to which the term was first applied. It is preferable to designate the British representatives magnesian limestones. Chemically, these are typically composed of about half carbonate of lime and half carbonate of magnesia, but the relative proportions vary with the stone from each quarry, and other constituents are always present. The following table† shows the chemical constitution of some well-known magnesian limestones:—

Chemical Composition of Magnesian Limestones.

	Bolsover Moor.	North Anston.	Stone Ends, North Anston.	Woodhouse.	Lindley's Bolsover Quarry, Woodhouse.	Steetly.
Carbonate of Lime	51·95	54·80	55·31	52·77	54·22	53·85
Carbonate of Magnesia	40·36	42·00	41·48	44·13	38·56	44·50
Sulphate of Lime	—	—	—	—	—	trace
Oxide of Manganese	trace	trace	—	—	—	—
Protoxide of Manganese	—	—	1·66	—	—	—
Carbonate of Manganese	—	—	—	1·71	2·43	—
Peroxide of Iron	·84	·24	—	—	·72	—
Protoxide of Iron	·84	·45	·73	·66	·74	·64
Silica	3·64	·57	·86	·47	1·08	·42
Water	·46	·52	·44	·23	·43	·12
Totals	98·09	98·58	100·48	99·97	98·18	99·53

The colour of magnesian limestone is usually either yellow or white; it is normally harder (3·5—4·5) than oolite, with a higher specific gravity (2·8—2·95), and is not so soluble in hydrochloric acid.

The origin of magnesian limestone and dolomite has always afforded a fruitful subject for discussion amongst geologists. In some instances it would appear that dolomite is an original chemical precipitate from the saline water of inland seas; in other cases true limestones seem to have been rendered dolomitic by the action of acidulated permeating water containing magnesia, whereby large proportions of calcite and aragonite were replaced by that mineral; or limestones already rich in magnesia may be dolomitised by the proportional abstraction of carbonate of lime, accompanied by considerable alteration and shrinkage in the mass. In regard to immense masses of dolomite such as those in the Eastern Alps, their exceedingly crystalline nature became developed subsequent to their original formation as magnesian limestone.

Geologists have always been puzzled in assigning the class of rocks under notice to their proper division, *i.e.*, aqueous or metamorphic. For our own part we recognise two distinct types of formation in them, one represented by the English rock, such as is built into the exterior of the Houses of Parliament, and which we should term magnesian limestone; the other by the crystalline masses in the eastern Alps, and in the United States, which we should call dolomite. The latter have evidently been rendered crystalline on the alteration of the former by a process akin to the changing of ordinary limestone into marble, to which reference will be made in the next article. Thus we should term the former aqueous (though much modified by the percolation of water), and the latter, metamorphic.

The structure of magnesian limestone is very characteristic. Fig. 1 represents the micro-structure of a thin section of Mansfield Woodhouse stone, magnified 40 diameters, from which it will be seen that it is an exceedingly fine-grained rock, composed of minute crystals of dolomite, whilst here and there grains of quartz or sand make their appearance. The boundaries of the crystals are well defined, and they are occasionally seen to coalesce with each other. The stone is light yellow in colour, very compact, and contains little specks of foreign matter, which, however,

* So called after the French geologist, Dolomieu.

† Compiled from Ransome and Cooper, "Mem. Geological Survey of Great Britain," Vol. II., part ii. (1848), pp. 685-702.

do not form a very appreciable proportion of the whole, and call for no special comment.

To the unaided vision many dolomites have the aspect of very fine-grained, semi-crystalline

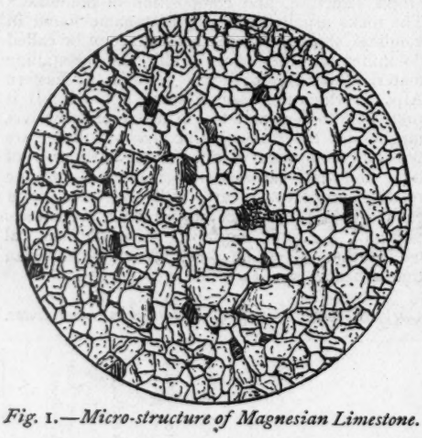


Fig. 1.—*Micro-structure of Magnesian Limestone.*

limestones; but the student, on comparing this with the micro-structure of calcareous rocks as described and illustrated in the last article, will at once perceive the great difference, microscopically, between the two classes of rock.

Some dolomites are comparatively coarse in structure, and present much analogy with true crystalline limestone (a metamorphic rock) when seen under the microscope. Such a one is illustrated by Fig. 2, which represents the micro-structure (magnified 40 diameters) of a

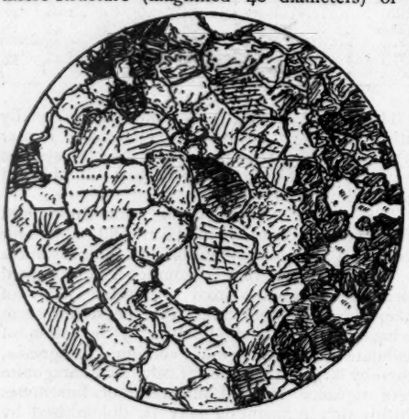


Fig. 2.—*Micro-structure of Dolomite.*

building stone quarried at Lanesboro, Fillmore County, Minnesota, U.S.A. It is not so compact in structure as the English rock illustrated, and is much coarser; some of the larger grains have traces of the natural cleavage of the mineral remaining, represented by parallel lines, the rhombic form of some of the crystals may also be observed. This structure is frequently accompanied by innumerable minute cavities which render the material unfit for high-class work. The student will therefore understand that the best dolomites should be finer grained.

The magnesian limestones, in addition to forming building stones of many varieties, often make excellent quicklime. The presence or absence of vesicular structure frequently determines their utility from a water-supply point of view, and this feature ought therefore to be studied with much care. The magnesium salts found in many potable waters have often been derived from these rocks. Their manner of weathering is very striking; and where they crop out at the surface they impress their character on the soil. As a rule magnesian limestones make good foundations.

GENERAL BUILDING NEWS.

MEMORIAL HALL, SEAHAM.—The workmen of the Seaham Harbour Bottle Works have organised a movement for erecting a memorial to their late employer, Mr. Robert Candlish. The memorial will be in the shape of a public hall with reading and recreation rooms, on an independent site near the works at Seaham Harbour, which has been designed by Mr. Frank Caws, architect, and the contract for which has been let to Mr. George Graydon, of Durham.

PUBLIC SCHOOLS, JOHNSTONE, RENFREWSHIRE.—At a special meeting of the Abbey School Board, Johnstone, the contracts for the erection of a new public school were under consideration, when the following contractors were selected:—Mason work, Messrs. William Jaffrey & Sons; joiner work, Mr. Alex. Morrison; slater and plaster work, Mr. George Thomson; plumber and gasfitting, Messrs. J. & W. Weems. The new school is to be erected within the present grounds possessed by the Board at Ludovic-square, and is to accommodate 585 scholars. The cost of the building, which does not include the furniture, is about 3,000*l.* The work will be proceeded with at once. Messrs. Kerr & Watson are the architects.

CHURCH, BARRY, GLAMORGANSHIRE.—On the 6th inst. the new Church of St. Paul, East Barry, was opened by the Bishop of Llandaff. The new church is built of Cattybrook brick inside and out, the exterior being of red and the interior of buff, relieved with bands of bath stone and red brick. The building is designed in the Early Gothic style, and consists of nave, side aisles, south transept, organ chamber, vestries, and chancel, with a tower at the west end and a heating chamber under the transept. The nave is 70 ft. long by 25 ft. wide, the aisles 10 ft. wide, chancel 32 ft. long by 20 ft. wide; transept, 18 ft by 13 ft. The roof of the nave is an open-timbered one, with tie-beams across, and the roof of the chancel is a barrel one. The arcade is of pitch-pine, with solid upright octagon posts, carried up in one piece to the wall plates. The arches are also of pitch-pine, filled up in the spandrils with tracery. The height from floor to ridge is 41 ft., and the total length of the church about 129 ft. by 53 ft., including tower. The first portion of the church now built is the nave, south aisle, and chancel, at a cost of about 2,340*l.* The church, when completed, will accomodate 600 persons, and the first portion now built will seat 470. The builder is Mr. William Richards, of Barry, and the architects Messrs. Kempson & Fowler, Cardiff. The sacrarium is laid with Godwin's tiles, and the glass is by Mr. Savell, of London, the steps being of Wilderness stone.

NEW HALL AND MARKET, ABERTILLERY.—The new public hall and market-place at Abertillery, Monmouth, was opened on the 6th inst. The main façade is designed in the English Renaissance style, freely treated. The outside walls and dressings are in Portland cement. The ground floor is mainly occupied by the market, which is fitted up with the usual fittings for stallholders. There are three entrances. The front and side abutting on the street are filled with six lock-up shops, and a balcony is arranged inside the hall and over the shops for the sale of poultry, &c. At the back of the market is a large room. The hall, which occupies the first floor, is capable of accommodating, with the balconies, seats for 1,250 people. Under the stage are the dressing-rooms, with separate entrances. The heating apparatus, supplied by Messrs. Hampton, Abergavenny, is on the high-pressure system. The erection of the building has been carried out by Mr. A. P. Williams, builder, Abertillery, at a cost of 4,000*l.*, from the design and under the supervision of Mr. Alfred Swash, architect, Newport.

PUBLIC BATHS, BATLEY.—Public baths, which have been erected at a cost of between 9,000*l.* and 10,000*l.*, were opened on the 9th inst. by the Mayor of the Borough (Mr. Councillor J. Auty). The architect was Mr. Walter Hanstock, of Batley. We gave a short description of the new baths in the *Builder* for September 12, 1891.

MISSION CHAPEL, CARDIFF.—On the 6th inst. the St. Elvan's Mission Chapel, Adamsdown-square, Cardiff, was dedicated by the Bishop of Llandaff. The building, which has cost about 800*l.*, is in connexion with All Saints' Church, and will accommodate 320 persons. It is built of red brick with bath stone dressings by Messrs. Cox & Bardo, from plans by Mr. Corbett. The seats are of red pine and the pulpit desk and reading desk of pitch pine.

YOUNG MEN'S CHRISTIAN ASSOCIATION BUILDINGS, ST. AUSTELL, CORNWALL.—Memorial stones of a building for the location of the St. Austell branch of the Y.M.C.A. were laid on the 7th inst. Plans of the new building, prepared by Mr. Snell, architect, of Plymouth, provide for a reading and writing-room, cloak-room, secretary's office, gymnasium, and lavatory on the ground floor, while on the first floor will be a large lecture-hall, capable of being partitioned into class-rooms. The builders are Messrs. W. H. Smith & S. Hunken, of St. Austell.

CATHOLIC CHAPEL, TOTNES.—The Rev. Bishop Graham visited Dundridge, Totnes, on the 5th inst. for the purpose of blessing the chapel just completed by Mrs. Robert Harvey, and dedicated by her to St. Rose of Lima, the patron saint of Peru. The building, which is in the Early English style, and comprises a nave and apse, was designed by Mr. W. M. Tollit, architect, of Totnes, and has been erected by Messrs. Rabich & Brown, of Paignton, in Devonshire brick, faced with Bath stone.

NEW CHURCH, GLASGOW.—On the 9th inst. the memorial stone of the Belmont Church, Hillside, Glasgow, was laid by Mr. J. G. A. Baird, M.P. The building will be cruciform in plan and Early English in style, into which is blended, says the *Glasgow Herald*, a phase of Scottish ecclesiastical work. It consists of a nave 40 ft. wide by 102 ft. long, with transepts on both sides—the transepts being separated from the nave by two lofty arches springing from columns, having moulded caps and bases. The chancel, which is situated at the south end of the church, is polygonal, and in it are placed the choir seats, communion table, and seats for elders. The chancel steps are of marble, and the entire floor of the chancel will be laid with encaustic tiles. The lower portion of the walls are panelled, the upper part being of dressed stone. The organ chamber, which is a divided one, is placed on either side of the chancel, and is separated from it, as also from the nave, by moulded arches. The chancel and nave will have open timber roofs formed of laminated and moulded ribs. The vestry and session-house are also at the south end, and are conveniently situated to the chancel. At the main entrance in Great George-street there is a vestibule extending the full width of the church, the floor of which will be laid with encaustic tiles. Entering off the vestibule is a ladies' cloak-room. A gallery is provided at the north end of the nave over the vestibule, and altogether the church will accommodate nearly 1,000 persons. Under the nave is a hall capable of seating 550, with platform at end, and retiring and cloak rooms. Kitchen accommodation is also provided for the use of the hall. The architect is Mr. James Miller, Glasgow, and Messrs. Guthrie & Co. are the contractors.

PARISH CHURCH, CRATHIE, N.B.—On Monday the Queen laid the foundation stone of the new Parish Church of Crathie. The new church has been designed by Mr. A. Marshall Mackenzie, A.R.S.A., of Messrs. Matthews & Mackenzie, architects, Aberdeen. The site is the same as was occupied by the old building, and the church will overlook the valley of the Dee. It is of Gothic design in the Early Scotch character. A light-grey granite, obtained from a quarry at Inver, about three miles from Crathie, will be employed in building the structure. The stone will be rock-faced. The building is in the form of a cross. From each side of the nave springs a transept, projecting 22 ft., and measuring 25 ft wide. The outside dimensions of the main building are 120 ft. long by 30 ft. wide. The east end is circular in form, giving an apse for the accommodation of the choir, the organ, and the communion-table. On the outside the walls will rise to a height of 22 ft., while the apex of the roof is 50 ft. from the ground. From the centre of the building will rise a square tower, carried to a height of about 65 ft.; and springing from this will be a slate-covered steeple 30 ft. high. The Queen's private entrance will be by the south transept, which will be occupied by the Royal pew. Seats for the heritors and a vestry will be provided in the north transept. The nave will be fitted up with pews for the congregation, the sittings numbering altogether about 450, including about 60 in a small gallery in the west gable. All the timber used in the construction of the Queen's pew, the apse, pulpit, and heritors' seat will be oak, while the woodwork in the other parts of the church is to be of selected pitch-pine. The ceiling is arched, lined with wood, and divided into panels with moulded ribs. Around the interior of the church will run a dado of woodwork, 6 ft. high; and above this the walls will be of bare granite. The cost of the church will be between 5,000*l.* and 6,000*l.* The contracts for the work are all held by tradesmen in Aberdeen.

WESLEYAN CHAPEL AND SCHOOL, FISHPONDS, GLOUCESTERSHIRE.—On the 6th inst. foundation-stones were laid of a Wesleyan chapel and schools at Fishponds. The chapel and school now being erected are from the designs of Mr. William Paul. The front is constructed of blue pennant stone, with dressings of Corsham Down and red Mansfield stones, with the addition of polished Aberdeen granite colums to the nave window and entrance. There are three entrances to the chapel from the front, and there is a communication between each of the porches and the main entrance, and also a staircase from each to the gallery over the principal entrance. The main wall of the front is recessed back at each side, giving greater effect to the side porches, which are in the form of battlement turrets, having truncated roofs with iron crestings and finials. A quatrefoil window is placed in the front wall of each of the turrets, which are further lighted by tracery windows at the side. Internally the chapel is about 60 ft. by 41 ft., with a gallery over the main entrance, and two transepts. It has seating accommodation for 450 persons. The ceiling will be polygonal in shape. Immediately at the back of the chapel are three vestries and lavatories, with a heating chamber for hot water apparatus below. The schoolroom is 45 ft. by 38 ft., with four entrances, and is surrounded by class-rooms of various sizes, separated by removable glazed screens.

PROPOSED WORKMEN'S DWELLINGS, SUNDERLAND.—The Sunderland Health Committee held a meeting a few days ago to consider the plans which had been prepared by the Borough Surveyor (Mr. R. S. Rounthwaite) for the erection of workmen's dwellings in place of the present houses in the Hatcase area, which the Council have decided to demolish. The scheme comprised three blocks of brick buildings, two of them of large size and a third smaller building, the cost of each being estimated respectively as follows:—No. 1 block, 8,400*l.*; No. 2 block, 6,650*l.*; No. 3 block, 1,750*l.*; total, 16,800*l.* The blocks were to be built round three sides of a square, with a large courtyard to each in the centre for clothes-drying purposes, and were to be three stories high. Galleries were shown running

round the second and third stories, giving access to tenements of two rooms each, namely, a kitchen and a bedroom. Each kitchen would be supplied with water, a slop sink, &c., and to each floor there would be appropriated a rang eof water-closets, and conveniences for the discharge of ashes by means of a spout leading to a large receptable on the ground, from which the refuse was to be carted away. The three blocks provided altogether for 96 tenements, or 192 rooms, the accommodation, it was estimated, being sufficient for between 400 and 500 people. This allowed for five persons per tenement of two rooms, and is about the same number as will be distenanted by the demolition of the present buildings. The blocks would abut on two streets, one 35 ft. wide, and the other 30 ft. The committee were able to come to no decision on the plans.

ADDITIONS TO HOSPITAL, LIVERPOOL.—On the 5th inst. an annexe to the St. Paul's Eye and Ear Hospital, St. Paul's-square, Liverpool, was opened by the Lord Mayor of Liverpool. The annexe will give an addition of twenty-five beds to the institution, at a cost of 1,000*l*. Mr. J. Clarke, of Liverpool, was the architect.

SCHOOL BUILDINGS, LIGHTCLIFFE, YORKSHIRE.—Sunday schools have been built at Lightcliffe for the Congregational Church. The new school, built from the designs of Mr. Thomas Barker, of Lightcliffe, is in the Gothic style, and the cost will be 2,645*l*.

RESTORATION OF ST. NICHOLAS CHURCH, TADMARTON.—The ancient church of St. Nicholas, Tadmarton, which has been closed for a period of five months to undergo restoration, was opened by the Bishop of the Diocese, Dr. Stubbs, on the 6th inst. The church consists of a chancel, nave, north aisle, and a battlemented tower at the end of the nave. The tower is of three stages; the two lower stages, says the *Banbury Guardian*, are of the period of transition from Early English to Decorated, and the upper stage is of the fifteenth century. The nave and aisle are separated by three Norman arches of a very simple character, and these arches appear to be the remains of a church of the eleventh century. The chancel is Early English, with some features of late Norman character, and the east window is an insertion of early Perpendicular work. The aisle is tolerably perfect, and has a thirteenth-century doorway. The east wall of the church has been entirely rebuilt. The whole building has been reroofed and the greater part of the floor has been concreted. The font has been removed from the west end to a prominent position near the door in the north aisle. The gallery at the west end has been removed, and the tower arch opened, and the space in the tower has been converted into a vestry. There has also been erected an approach to the ringing-loft, in the shape of a ladder enclosed in a deal panelling. A screen, also in deal, has been erected a few feet from the west door and extending across the tower, and an oak screen has been put up across the arch. New pews for the entire area of the church, with the exception of a few of the fifteenth-century seats in the north-west corner, have been put in, and a new pulpit, also of oak, has been erected. The Norman arcade has been cleaned, the plaster and yellow wash having been entirely removed. The east window in the aisle has been rebuilt, and an oak door has been put in the north entrance. Messrs. Milne & Hall, London, are the architects, and Mr. J. S. Kimberley has carried out the work of restoration.

SANITARY AND ENGINEERING NEWS.

DRAINAGE, SOUTHWOLD-ON-SEA.—At the last meeting of the Southwold Town Council it was agreed to adopt the scheme of Mr. Frederick Beesley, M.Inst.C.E., of Westminster, for the drainage of the borough.

PROPOSED RESERVOIR, MONKSWOOD, BATH.—A Local Government Board inquiry was held by Mr. S. J. Smith, at the Guildhall, Bath, on the 5th inst., into the application of the Town Council for the purpose of constructing a reservoir at Monkswood, which will contain 50,000,000 gallons. It had been proposed to purchase springs, and a Local Government Board inquiry was held, but the suggestion was adversely reported against, and a recourse to storage recommended. The Council had adopted the idea, and now proposed to form a reservoir in the Monkswood Valley. Evidence was given to show that in the driest season there had been sufficient water run to waste to fill a reservoir with a capacity of 50,000,000 gallons, at a cost of 30,000*l*. Mr. Fox, C.E., in answer to the Inspector, said the work would be completed in two years. There was no opposition to the scheme.

PROPOSED WATER SUPPLY, PORTLAND.—On Tuesday last Colonel W. M. Ducat, R.E., Local Government Board Inspector, held an inquiry at the Local Board Office, Portland, respecting the proposed new water supply to the island. The local authorities had applied for sanction to borrow the sum of 23,000*l*. for the purpose, the existing sources of supply being very unsatisfactory. A well has already been sunk in the southern part of Portland, and an abundant supply of water reached; the site was chosen a few years since by some well-known geologists. There was considerable opposition to the application, principally from some quarrymen of the island, who seem to think that because the existing supplies were good enough for their ancestors, they will also do for the present. But the population has largely increased during the last fifty years, and we are informed on excellent authority that by reason of the close proximity of cesspools to the wells many of the latter have become much contaminated. A sample of the water which we ourselves examined there the other day left much to be desired, and we think the Local Board are wise in seeking a purer source. There appears, however, to be some doubt as to the actual yield of the new well, and in the end Colonel Ducat was requested to obtain authority for carrying out a pumping test to determine the quantity of water actually available. It is thought that the amount now yielded by the well is practically a minimum in consequence of the dry summer; its quality is excellent. The matter is therefore held over until that important point is settled.

FOREIGN AND COLONIAL.

FRANCE.—A new Lycée for girls is to be built in the Faubourg Poissonnière at Paris, to be called the "Lycée Lamartine."——On the Place Vauban, behind the École Militaire, the monument is to be erected to the memory of the soldiers and sailors who have died in foreign countries in the service of France.——The Municipal Council of Paris has commissioned M. Dulong, municipal architect, to prepare the plans for a large philanthropic establishment which is to be erected in the XVIIth Arrondissement, and which is to include a refuge for women who have no employment, workshops, and a refectory for paupers.——The Directeur des Beaux-Arts has just submitted to the Ministre de l'Instruction Publique a list of proposals in regard to the commissions to be given in connexion with the Gobelins manufactory. The list includes the names of MM. Jean Paul Laurens, Gustave Moreau, Vibert, Coquart, and Maurice Leloir. This last-named artist has been already commissioned to execute the cartoon for a tapestry representing "Le Roman au XVIII^e^ Siècle."——The sculptor Bouillon is at present occupied in putting the finishing touches to the monument which is to be erected in the Luxembourg Garden to the memory of Henri Mürger. The monument, which will be placed side by side with that to Théodore de Banville, near the Rue Medicis, will consist of a stele supporting a bust of the celebrated romancist. At the foot of the monument two standing figures will represent two of his heroines.——A competition has been opened at Suresnes for the construction of a Salle des Fêtes and a school.——At Montbard on Sunday last there was inaugurated a very fine monument to General Junot, afterwards Duc d'Abrantès, who was so conspicuous a figure in the wars of the first Napoleon.——The monument which has been raised at Dunkerque in memory of the siege sustained by that town in 1793 is the work of the sculptor Lormier. It is composed of a column supporting a winged figure of Victory brandishing a branch of laurel. The pedestal is decorated with a fine bas-relief recording the part taken by the inhabitants in the defence of the town.——In the little town of Senones (Vosges) a monument commemorative of the centenary of the union with France of the principality of Salm-Salm has just been erected. The monument, raised by public subscription, is the work of a Vosges sculptor, M. Descelles. It consists of a pyramid of granite, the square pedestal of which is ornamented with bronze-bas-reliefs.——It appears that the Conseil-Général of the Lower Seine and the Municipal Council of Rouen have both formally refused to contribute to the fund required (as mentioned in our last) for the repair or restoration of Rouen Cathedral.——After thirty years of hesitation, the bridge over the Seine between the communes of Puteaux and Neuilly is at last to be commenced. The bridge will bear the name of Sir Richard Wallace, will be 300 yards long, and will cost about 930,000 francs. It will be in two distinct parts, united by a viaduct traversing the Ile Rothschild. There will be two bays on the wider arm of the Seine and two smaller arches on the narrow arm, which is not navigable. The bridge is expected to be completed in the summer of 1895.——On Sunday, the 24th, there is to be inaugurated at Andelys the bust of the painter Chaplin, executed by M. Etienne Leroux. The monument will be placed on the square between Great and Little Andelys.——The Conseil-Général of La Vendée has adopted a scheme for the reconstruction of the Hôtel of the Préfecture of Laroche-sur-Yon, which was burned in April last.——M. Alfred Picard, Rapporteur Général of the Paris Exhibition of 1889, has been appointed Commissaire-Générale of the exhibition of 1900.——The death is announced of M. A. C. Benoit-Duportail, a distinguished engineer and a collaborator in the *Revue de l'Architecture* and the *Semaine des Constructeurs*. He was librarian to the "Société des Ingénieurs Civils" of France, and curator of the museum of the "Société Centrale du Travail Professionel." He died at the age of seventy.

DENMARK.—One of the most remarkable sights in Copenhagen is that of the ruins of the great Royal Palace of Christiansborg, the restoration of which is urgently demanded of the Danish Parliament. It may be remembered that a fire occurred in the palace on October 1, 1884, and that it was greatly damaged, many art treasures, including famous works by Thorwaldsen, being also destroyed. At the time of the fire the Houses of Parliament were also located in the building, separate from the Royal residence, but after the destruction it was a general public desire that the building should be restored as a Royal residential palace alone. However, up to the present nothing has been done financially except the collecting of a national subscription, freely responded to, towards the rebuilding. But designs, plans, and estimates for the reconstruction have been received from various architects of late years by order of the Parliament. These, however, provide principally for the locating by the building of an additional wing, also of the Rigsdag and the Supreme Court of Judicature in the building, and that the cost of the royal portion, exclusive of artistic ornamentation, should not exceed a sum of 6,000,000 kr. The drawings have been publicly exhibited, and considered by a committee appointed by law, and it is expected that a final decision respecting them will shortly be arrived at. Plans have also been prepared for carrying out the general public desire of restoring the place as a Royal residence solely, and to build a separate Parliamentary house elsewhere. It has, however, been found that none of these plans entirely solve the problems set forth in the Act of Parliament, for the simple reason that the limit of cost is too narrow. To carry out the first-mentioned plans, it is estimated that quite 10,000,000 kr. would be required. In this dilemma a third proposal is now being considered. This is to rebuild Christiansborg solely as a *locale* for the Rigsdag, the Crown Offices, and the Supreme Court, and to render the present Royal residence and four other palaces close by suitable for permanent occupation by the sovereign. This arrangement would keep the cost of the rebuilding of Christiansborg within the prescribed limits, and, moreover, the building could be finished in half the time. With a royal residence t might occupy a whole generation. The new proposals have found many adherents, who urge upon the Government to prepare a Bill for the Rigsdag authorising the immediate commencement of the work, and doubtless, therefore, definite steps will soon be taken. Moreover, it is pointed out that the great work sketched out would provide employment for a large number of professional workmen for some years to come. Christiansborg, by the way has been the official residence of the Danish kings during four reigns.——The "Marble Church" in Copenhagen, on which work has been in progress at long intervals for a couple of centuries, is now approaching completion. We have on several occasions referred to this edifice, built almost entirely of white marble. The church is in reality a cathedral, with all its attributes. The work executed in modern times has been very great, the sum expended in recent years alone amounting to 60,000*l*., but much is still to be done in the way of decorations, ornaments and fittings, installation of organ, altar, heating, ventilating apparatus, &c. The work of laying the mosaic floor is now being proceeded with. The scaffolding in the interior having been removed, it is anticipated that the edifice may be consecrated for provisional service next spring. However, the interior is somewhat disappointing, although the height of the dome is 130 ft., and the exterior is less imposing by the absence of spires and wings. It is claimed that in diameter the church ranks as the sixth in Europe. From an architectural point of view, however, the interior, with its bold and beautifully carved arches and the lofty ceiling, is very fine, and ranks among the handsomest specimens of modern Gothic work in Europe. The dome represents the sun on azure background, below which are painted the twelve Apostles, 20 ft. in height, the work of the late Professor Olrik and Herr Overgaard. The twelve stained windows are framed with polished marble plinths. Along the dome runs a gallery with a gilt grille, supported by twelve gigantic columns of grey marble, within which are the reserved pews. In the columns are hollowed eight niches for statues. It is stated that the acoustic properties of the edifice are far from good, this being particularly the case in the centre of the church. It is, for instance, said that words even whispered are re-echoed on the opposite side. The altar will face the main entrance. The church will be lighted by the electric light. There are four entrances. Several eminent architects have had the edifice in hand in course of time, the present being Herr Etatsraad Yeldahl, Crown Architect, who has also designed the twelve large bronze figures of the Apostles adorning the exterior.——The foundation stone of a new important asylum has just been laid by the President of the Copenhagen Corporation, called the Alderströst, a residence for aged artisans, with twenty-five workshops. The main building has a frontage of 268 ft., a depth of 36 ft., and a height of 60 ft., the number of stories being five. In addition there is to be a second building, parallel with the first, 290 ft. in length, and shortly to be commenced, a third but smaller residence being also contemplated. The establishment is to be ready in a year. The exterior is to be treated with more attention to architectural effect

COMPETITIONS AND CONTRACTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
School Buildings	Barrowford Sch. Bd.	.....	Sept. 25
School Buildings, Chalton	Toddington Sch. Bd.	.....	Sept. 30
*Technical School and Lecture Hall	West Hartlepool Corp.	50*l.* and 25*l.*	Dec. 1

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Hospital Buildings, Clatterbridge	Wirral Union	A. Culshaw	Sept. 19
*Broken Granite	East Ham Local Board	— Savage	do.
Railway Swingbridge, Salford	Manchester Ship Canal Co.	*Official*	do.
*Granite	Aldershot Local Board	do.	do.
Levelling, Metalling, Paving, &c. Nelson-street	do.	do.	do.
Port Philip Road Metal (1,150 yards)	Lewisham Bd. of Wks.	do.	do.
*Broken Stone	do.	do.	do.
Alterations, &c. to Market Hall	Whitehaven Town and Harbour Trustees	do.	Sept. 20
Drainage Works, Gresley	Burton - on - Trent U.R.S.A.	Geo. Watson	do.
Dispensary Buildings, Moyderwell	Tralee Union	E. Keane	do.
Supply and Laying (570 yards) Cast-iron Water Mains	Hertford Corporation	T. R. Dickinson	do.
Two Houses, White-le-Head, co. Durham	G. Bolam	.....	do.
School Buildings, Halifax	Trustees of Wainstall's Mount Pleasant Chapel	.....	do.
*Sewers Works	Banbury U.R.S.A.	W. O. White	Sept. 21
*Tar Paving	Eastleigh Local Board	A. W. Galbraith	do.
*Broken Granite	Bethnal Green Vestry	F. W. Barratt	do.
Additions, &c. to Workhouse	Stroud Union	W. H. C. Fisher	do.
Church and School, Newcastle-on-Tyne	.....	Walker & Collinson	do.
Covered Reservoir (2,000,000 gallons)	Swindon Waterworks Co. Lim.	J. R. Shopland	do.
*Works at Nottingham, &c.	M. R. Co.	*Official*	do.
Bridge Works, St. Katharine's Docks	London & India Docks Joint Committee	do.	Sept. 23
Banking Premises, Carlisle-circus, Belfast	Ulster Bank, Lim.	Vincent Craig	do.
Additions, &c. to "Plough Inn," Powburn, Alnwick	Capt. J. R. Carr-Ellison J.P.	Geo. Reavell, Jun.	do.

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Levelling, Paving, Channelling, &c.	Compton Giffard Local Board	R. H. Worth	Sept. 22
Reservoirs, &c. Colyton, Devon	Albert Edwards	.....	do.
Church Restoration, Braithwell, Yorks	.....	J. D. Webster	do.
School Buildings, South-street, Bedminster	Bristol School Board	W. V. Gough	Sept. 23
Street Works	Batley T.C.	H. Dearden	do.
Wards and Alterations to Buildings	Gravesend Hospital Committee	.....	do.
Free Library, South Shore	Blackpool Corp.	Farrow & Nisbett	do.
School Buildings	Sunderland Sch. Bd.	J. Wolstenholme	do.
Iron Buildings, Workhouse, Old Windsor	Windsor Union	*Official*	do.
Welsh Paving Setts, Abercorn Basin	Belfast & Co. Down Rly. Co.	do.	do.
*Granite and Broken Flints	Kingston - on - Thames Corporation	do.	do.
*Road-Making and Paving Works	East Barnet Valley Local Board	do.	do.
*Sewers Works	Crewe Town Council	G. W. Brumell	Sept. 22
Church Restoration, Westerleigh, Glos.	.....	G. Eaton-Shore	do.
*Materials for Street Paving	Greenwich Bd. of Wks.	Sedding & Wilson	do.
*Broken Granite, Gully Grates, Steam Rolling, &c.	Edmonton Local Board	*Official*	do.
Sewerage Works, Oakwood-road	Maidstone U.S.A.	G. Eedes Eachus	do.
Pipe Sewer (340 yds.), Sheriff-street	West Hartlepool Corp.	W. G. Scoones	do.
*Road-Making and Sewer Works	Tottenham Loc. Bd.	J. W. Brown	do.
*Additions, &c. to Hotel	Ascot Royal Hotel	J. E. Worth	do.
*Making-up and Paving Roads	Fulham Vestry	.....	Sept. 27
Water Supply Works	Blandford Waterworks Co. Ltd.	W. Sykes	do.
*Sewerage Works, Totland Bay	Isle of Wight R.S.A.	F. Beesley	do.
*Infirmary	Dover Union	W. Lidstone	do.
Two Semi-Detached Houses, Pudsey (Yorks)	.....	Cresswell & Newman	Sept. 28
*Sewerage Works	Northam U.S.A.	H. Hodgson	do.
*Supply of Stores	G.W.Ry. Co.	B. Latham	Sept. 30
Isolation Hospital, North Denes	Great Yarmouth U.S.A.	*Official*	Oct. 2
*Construction of Storage Reservoir	Bath Corp. Waterworks Com.	J. W. Cockrill	do.
*Pavilion at Pier Head	Ryde Pier Co.	Wm. Fox	Oct. 4
*Small Houses and Shop, Oxford	Oxford Corporation	J. J. Barton	Oct. 4
*Concrete Flushing Tanks	Beckenham Loc. Bd.	W. H. White	Oct. 7
*Technical Instruction Buildings	Staffordshire C.C.	G. B. Carlton	Oct. 9
*Enlargement of New Station, &c. Leeds	N.E. and L. & N.W. Rly. Co.	Bailey & McConnal	Oct. 10
Out-buildings, near Tavistock, Barnstaple	T. H. Delve	H. Copperthwaite	Oct. 14
Eight Houses, Nelson (Lancs.)	C. Greenwood	.....	No date
Chapel, New Hall-street, Burnley (Lancs.)	F. Hirst	.....	do.
*New Fever Blocks to Hospital, Cheltenham	.....	.....	do.
		Middleton, Prothero & Phillott	do.

Those marked with an Asterisk (*) are advertised in this number. *Competition*, p. iv. *Contracts* pp. iv., vi., viii., ix. *and* xxiii. *Public Appointments*, p. xx.

than is usual in this class of structure. The total cost is estimated at about 32,000*l.*, there being residential flats for 200 families. The buildings have been designed by Herr Thorv. Sörensen, architect. —— The leading Danish organ, the *Dagblad*, raises a strong protest against the re-modelling and enlargement of the so-called Lichtenberg palace in Horseus, Yutland, now used as a theatre. The owner contemplates the adding of a second story, etc., but only one architect has been found willing to undertake the work. The matter has to be decided by the Ministry of Public Culture, from which leave must be obtained for the alterations.

MISCELLANEOUS.

SCHOOL OF ART, ST. THOMAS, CHARTERHOUSE.—We have received the circular of the School of Science and Art of St. Thomas, Charterhouse, which gives instruction in elementary and advanced drawing, building construction, geometry, applied mechanics, &c. (we name only the subjects of interest to our readers), at very low rates. It is stated that during the past year over 200 successes have been obtained by the students of this School of Art at the Government Examinations.

REMOVAL.—We are informed that Messrs. C. J. Wade & Co., timber merchants and importers, have removed from 153, Leadenhall-street, E.C., to more convenient offices at 8 and 9, Great St. Helen's.

A DISCLAIMER.—Messrs. W. W. Rowe & Sons, builders, of Durham-road, ask for space to state that they are in no way connected with another builder of the same name, against whom a receiving order was made in August last.

THE UTILISATION OF SAWDUST.—A process has been invented by a Swedish engineer by which sawdust may be turned into charcoal, tar, and wood acid, and a syndicate of sawmill owners has been formed in Sundswall for carrying out experiments with the same on a large scale.

"ENGLISH" MOULDINGS.—The Swedish-Norwegian Consul-General in London reports to his Government the following case of importance to dealers in mouldings. A parcel of door, window, and ceiling mouldings arrived from Sweden, without any mark of origin, as required by the Merchandise Marks Act of 1887, but *bearing the full name of the English consignee and vendor*, and, of course, the entire quantity was promptly seized by the Customs officials, and we are glad to learn that, in spite of the efforts of the Swedish representative, the former have declined to give up the fraudulent goods, which are therefore forfeited. The Consul, in his report, urges manufacturers not to omit the necessary words of origin, "made in Sweden," on all articles, or they will share a similar fate.

RIVERS POLLUTION IN LANCASHIRE.—The various County Councils and Joint Committees of Lancashire responsible for the carrying out of the Rivers Pollution Act are increasing in activity, but not in anything like proportion to the importance and urgency of the subject. At the monthly meeting of the Ribble Local Committee recently there were many complaints. It was stated that untreated sewage from the Chorley Sewage Farm flowed into the Yarrow, which was as black as ink, and contained solid lumps of sewage. The cows drank the filth, which probably means fever to those using their milk. The Parbold Parochial Committee complained of the pollution of the Douglas by refuse from alkali works known as "blue Billy," by overflow from the Wigan Sewage Farm, and by refuse which the Corporation of Bootle allowed to be deposited on the banks at Gillibrand. In the above cases the inspector was ordered to examine and report thereon. Two months' notices were directed to be served upon several firms of brewers and manufacturers who were polluting streams with refuse. It was resolved that summary proceedings be taken in cases of pollution by solids after notice had been disregarded. A committee was appointed to collect statistics as to the pollution of the Ribble estuary, with the view of applying to the Local Government Board for an order to include within the Committees area the outlets of the Lytham and Southport sewage.

CURTAIN ROD BRACKETS.—Messrs. Bodell, Parker & Co., of Birmingham, send us a specimen of their curtain rod brackets, which are small neat-looking brass brackets intended to screw into the window sash to take the ends of the rod holding a window curtain. Something of the kind has been long wanted, and this seems to meet the case very well.

THE NEW RUSSIAN DUTIES.—It may be of interest to state, for the advantage of manufacturers, that by the increase of duties in Russia they are now as follows on certain German products:—Cement, 100 sh.; copper colours, 111 sh.; coarse cast-iron goods, 167 sh.; manufactured ditto, 242 sh.; iron pipes and mains, 252 sh.; sheet-iron for building, 128 sh.; all per ton.

PATENT SAFETY SHOES FOR LADDERS.—Mr. L. W. Sutcliffe, engineer, of Manchester, has patented a simple but very useful improvement for ladders, consisting of shoes to be affixed at each end of the ladder rails to prevent the ladder slipping either on the ground or along the wall against which it leans. The shoes at the lower end are fixed to swivels, so that the ladder will hinge on them in the same way as a pair of shears, and the surfaces of the shoes which rest on the ground are covered with corrugated indiarubber which has a hold on the ground. Similar shoes are fixed at the top so as to hold against the wall and prevent the ladder slipping to one side under any unequal weight. The rubber facings can be renewed when worn. This appears to us to be a most useful though simple invention.

TRADE CATALOGUES.—We have received from Messrs. Ropkins & Co. (Nene Sawing, Planing, and Moulding Mills) a catalogue of sections of their stock of mouldings.——From Messrs. Allard & Co., an illustrated catalogue of their office, library, and board-room furniture, presses, letter-racks, and other things required in the furnishing of business-rooms.——Messrs. Richard Crittall & Co.'s catalogue of selected examples of door furniture and electric switch covers, &c., illustrated by photographs, is quite in advance, in point of taste, of the ordinary run of "trade catalogue" designs. The designs are mostly for execution in repoussée metal work.

A LOCKING ENVELOPE.—The "Dagonet" envelope is intended for halfpenny postage, to supersede the present system of merely turning in the flaps. The covering slip has a tongue fitting into a slit in the lower portion of the envelope, which keeps it secured nearly as well as if sealed, but can be easily opened at the Post Office if required. We are told that the Post Office authorities accept it as an envelope for halfpenny postage. It is the invention of an architect, Mr. Thomas Durrans.

BUSINESS CHANGE.—We are informed by Messrs. E. Graham Simpson and F. Coleridge Simpson that in consequence of the retirement from business of their father, Mr. E. H. Simpson, the business hitherto carried on by him at 100, St. Martin's-lane, under the style of W. B. Simpson & Sons, decorators, will, as from September 29 next, be carried on by them as his successors at 99, St. Martin's-lane (adjoining the old premises), under the style of W. B. Simpson & Sons, as heretofore. The business relations of the firm with Messrs. Maw & Co., Limited, will not be affected, and Messrs. Simpson will remain their appointed London agents.

WATER SUPPLY OF MANCHESTER.—Considerable anxiety is being experienced in Manchester at the diminution of the water in the reservoirs to twenty-four days' supply as against forty-nine days' supply on June 19, when the precautionary measure of cutting off the supply at 8 p.m. was adopted, and also as to its inferior quality, and to the fact that the new supply from Thirlmere will not be available until next May or June. At the last meeting of the

City Council on September 6, it was stated that since the resumption of the full supply on August 9, when the quantity was sufficient for forty-one days, it had diminished until on September 6 there remained only enough water to furnish twenty-four days' supply. The quality of the water received from the taps was very inferior, as the latter contained an abundance of animal life which was visible to the naked eye. The only remedies proposed was to return to the practice of shutting off the water at eight p.m., and to have the water courses carefully attended to every day, so that every possible danger of pollution should be guarded against. It looks as if the complaints made about resuming the full supply on August 9, when the quantity in store showed a diminution, are justified.

SANITATION IN BURMA.—Very little progress has been made in the drainage of town areas in Burma, and it would appear from the report of the Sanitary Commissioner that the main obstacle to this is to be found in what the report styles "the undesirable legacy of badly-chosen low-lying sites from the original founders of the majority of Burmese towns." These sites must be raised before ordinary drainage by gravitation can be carried out, and in some cases this has been done by using the soil obtained from specially excavated tanks. But the stagnant bodies of water thus created are, it is stated, open to pollution from a hundred sources, and constitute an element of danger to the public health. Instances illustrating this point are taken from Rangoon itself, where a sample of water from a tank in the Theyagon quarter, when there was a severe outbreak of cholera, was pronounced to be "little less than effluent sewage;" while in the same town there are other large tanks which are greatly befouled. Surgeon-Major Dalzell again emphasises the importance of raising the sites on which it is intended to build new houses, and says "had such a measure been enforced twenty years ago we should not now see houses surrounded by, nay, standing on, filthy mud or stagnant water for half the year."—*Indian Engineer.*

CAPITAL AND LABOUR.

THE CARDIFF BUILDING TRADES.—The Master Builders' Association at Cardiff have given notice of a general lock-out of their *employés*, owing to the action of the Trades Unionist masons employed by a member of the Association. On the 11th inst. this employer was informed that unless he discharged the sixteen non-society men working for him the unionists would strike. He declined, and the men abandoned work that evening, having put in the customary day's notice. The matter having been brought before the Master Builders' Association, they decided that unless the striking unionists returned to work on Wednesday morning, there would be a general lock-out. About a thousand men are involved in the result.

MEETINGS.

SATURDAY, SEPTEMBER 16.

Glasgow Architectural Association.—Visit to the Ayr ree Library, &c.

TUESDAY, SEPTEMBER 19.

Glasgow Architectural Association.—Mr. R. Brydall on "Scotch Ecclesiastical Architecture." 8 p.m.

WEDNESDAY, SEPTEMBER 20.

Builders' Foremen and Clerks of Works' Institution.—Ordinary Meeting. 8.30 p.m.

SATURDAY, SEPTEMBER 23.

Architectural Association.—Visit to Hatfield House. Train leaves King's Cross at 1.35 p.m.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

16,755.—VENTILATION: *J. C. M. Bishop.*—With the view of perfecting the ventilation of dwelling-houses by securing uniform and equally-distributed currents of air, inlet ducts, according to this invention, are devised, and these, in conjunction with a central chamber, are so arranged as to draw in the outer air and distribute it equally over the whole of the house or over the particular apartment to be ventilated.

18,180.—VENTILATING STOVES: *H. J. Piron.*—Three walls or jackets are made (1) an inner jacket of corrugated sheet or cast-iron; (2) a middle jacket made with ribs or projections; and (3) a cast-iron outer jacket. These details are arranged to ensure perfect combustion, the air being taken from the room rising between the corrugated jacket and the iron jacket passing over the surface of the ignited fuel and rising to the top of the stove.

4,013.—CHIMNEY CAP OR COWL: *S. & J. Chandler.*—The object of this invention is to cure smoky chimneys, and a cowl of peculiar form is used. The shaft of the cap or cowl has, at a suitable distance above it, a conical top slightly larger than the shaft. This cap is fixed to rods sliding in guides, and adapted to be lifted to such an extent that when a chimney-sweeper's brush comes against it, it will allow the brush to pass above the top of the shaft to thoroughly sweep the chimney.

5,439.—CHIMNEY TOPS: *W. Wagstaffe.*—According to this patent the column of the ventilating shaft or chimney is capped. The upward current escapes through slots or perforations, screened off to prevent down draught. If a down-draught enters the screen it must pass the perforation, and exhaust at the bottom of screen.

9,803.—SCAFFOLDING: *P. P. Massau (Cologne).*—To make a scaffold easily moved, four or more vertical supports are provided at their lower end with rollers. To each of the upper and lower ends of the supports are pivoted two rods, having a reciprocal telescopic movement in a diagonal direction. The platform supports are made to rest in hooks, which can be placed at any desired height.

11,023.—DRYING BRICKS: *M. Wolff.*—In order to dry bricks thoroughly by hot air, a drying chamber, with rails, tracks, and cars, is provided, by which, when the hot air is passed over some of the bricks, they are then moved a stage or two further, until finally dried, the feeding and discharging constantly going on.

13,034.—AUTOMATIC TAPS: *J. H. Landgrelie.*—A tap in which the water is allowed to flow by raising a lever; when this is released the lever falls by its weight and closes the tap. The simplicity of the working parts is also notable in this invention.

NEW APPLICATIONS FOR LETTERS PATENT.

AUGUST 29.—16,222, R. Sayer, Sanitation.—16,237, S. Hoskin, Brick-making Machines.—16,249, J. Merryweather, Drain or Sewer Pipe.

AUGUST 30.—16,323, W. Dransfield, Water and Gas-pipe Hooks.—16,324, J. Fletcher and others, Apparatus in connexion with Pipe or Brick-making Machines for Pressing tuyères made from Fireclay, &c., and forming Holes in same.—16,344, E. Dredge, Automatic Door-stop.—16,349, W. Williams, Screws.

AUGUST 31.—16,378, W. Ross, jun., Actuating Water-waste Preventing, and other Valves in Wood Cisterns lined with Lead or other Metal.—16,388, R. Young, Window-fasteners.—16,415, W. Burr, Fireproof Ceilings.—16,419, W. Allen, Chimney Cowls.

SEPTEMBER 1.—16,432, J. & R. Shaw, Automatic Saw-sharpening Machine.—16,451, J. Booth and T. Kirk, Flushing Water-closets, &c.—16,454, A. Boult, Material adapted as a Substitute for Wood, Metal, Stone, &c.—16,470, T. Kitto, Asphalt and Lead Cement Paving.—16,477, G. Vaughan, Attaching Door-knobs to Spindles.

SEPTEMBER 2.—16,518, M. McHaffie, Building Bricks.—16,560, G. & A. Marchant, Fastenings for Windows, &c., to Prevent Windows from being Opened from the Outside, and to Prevent Shaking when Closed.

PROVISIONAL SPECIFICATIONS ACCEPTED.

4,919, W. Kilkenny, Combined Screw and Nail.—11,317, H. Salmon and J. Whiting, Substitute for Pumice Stone.—12,536, W. Callow, Water Waste Preventers.—13,578, W. Hayhurst, Cramps for Flooring with or Cramping Boards up.—13,958, F. Baker, Window-fastenings.—14,437, J. Nash, Manufacture of Bricks and Tiles.—14,760, W. and E. Freeman, Soil-pipes and Ventilating Shafts therefor.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

15,997, W. Bundy, Workman's Time Recorders.—17,544, A. Storey, Clamp or Vice.—8,314, J. Luscher, Adjustable Mitre Boxes.—13,440, D. Morgan, Flushing Stench Traps and other Pipes and Passages, principally applicable to Water-closets and Sinks.—13,705, J. Schmidt, Holders or Clamps for Circular Saws.—14,629, C. Gottsmann, Closets.

SOME RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

SEPTEMBER 5.—By *A. Turner & Co.*: "Broome Park Estate," Betchworth, Surrey, 55 acres, f., 14,500*l.*—By *Brougham, Rogers & Co.*: 37, St. Margaret's-grove, Twickenham, and a plot of land, f., 300*l.*

SEPTEMBER 6.—By *Drew & Son*: 48, Percy-rd., Kilburn, u.t. 186 yrs., g.r. 7*l.* 4*s.*, r. 33*l.*, 300*l.*

SEPTEMBER 7.—By *W. J. Newell*: 88 to 94 even, Church-st., Deptford, u.t. 60 yrs., g.r. 9*l.*, 605*l.*; 139 & 140, Evelyn-st., u.t. 67 yrs., g.r. 10*l.*, 430*l.*; 4 & 6, Oareboro-rd., u.t. 73 yrs., g.r. 6*l.*, 260*l.*

[*Contractions used in these Lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G. ton	9/0/0	0/0/0
Teak, E.I. ..load	9/10/0	15/0/0
Sequoia, U.S.ft.cu.	2/3	2/6
Ash, Canada load	2/3/0	3/10/0
Birch, do.	2/15/0	3/18/0
Elm, do.	3/0/0	4/5/0
Fir, Dantsic, &c.	1/5/0	2/15/0
Oak, do.	2/15/0	5/5/0
Canada	5/15/0	7/5/0
Pine, Canada red	2/5/0	2/18/0
Do. Yellow	2/5/0	4/10/0
Lath, D'ntsic, fath	4/10/0	5/10/0
St. Petersburg..	5/0/0	6/10/0
Wainscot, Riga, &c., log	2/15/0	5/0/0
Odessa, crown	2/15/0	5/0/0
Deals, Finland 3nd & 1st std 100	7/0/0	9/10/0
Do. 4th & 3rd ..	6/10/0	7/0/0
Do. Riga	7/0/0	8/10/0
St. Petersburg, 1st yellow	9/0/0	12/10/0
Do. 2nd yellow..	7/0/0	8/0/0
Do. white	8/0/0	10/10/0
Swedish	7/0/0	15/0/0
White Sea	7/0/0	15/10/0
Canada, Pine 1st	21/10/0	28/10/0
Do. do. 2nd	16/0/0	17/10/0
Do. do. 3rd &c.	7/10/0	10/5/0
Do. Spruce, 1st	8/10/0	10/10/0
Do. do. 3rd & 2nd	6/10/0	7/15/0
New Brunswick	6/0/0	7/5/0
Battens, all kinds	3/0/0	15/0/0
Flooring boards, sq., 1 in. prep. 1st	0/9/6	0/14/0
Do. 2nd	0/7/6	0/11/6
Other qualities—	0/4/6	0/7/6
Cedar, Cuba ..ft.	/4	/4½
Honduras, ..&c	/4	/4½
Mahogany, Cuba	/4	/6½
St. Domingo, cargo av.	/3	1/6
Mexican do. do.	/3½	/4½
Tobasco do. do.	/3½	/6
Honduras do. ..	/4	/5½
Box, Turkey ton	4/0/0	13/0/0
Rose, Rio	9/0/0	20/0/0
Bahia	8/0/0	18/0/0
Satin, St. Doming	0/0/6	0/1/3

TIMBER (*continued*).		
Satin, Porto Rico	0/0/7	0/1/6
Walnut, Italian ..	0/0/3½	0/0/7
METALS.		
Iron—Pig, in Scotland .....ton	2/2/8½	0/0/0
Bar, Welsh, in London	5/17/6	5/10/0
Do. do. at works in Wales.....	5/7/6	5/10/0
Do. Staffordshire, in London	6/0/0	6/10/0
COPPER—British, cake and ingot	46/5/0	46/15/0
Best selected ..	47/5/0	47/15/0
Sheets, strong ..	55/0/0	0/0/0
Chili, bars	43/1/3	43/8/9
YELLOW METAL lb	0/0/4½	0/0/5
LEAD—Pig, Spanish.....ton	9/16/3	9/17/6
English com. brands	9/17/6	10/0/0
Sheet, English, 6 lbs. per sq. ft. and upwards....	11/10/0	0/0/0
Pipe.....	12/0/0	0/0/0
ZINC—English sheet.....ton	21/10/0	0/0/0
Vieille Montagne	22/0/0	0/0/0
TIN—Straits.....	80/0/0	80/10/0
Australian.....	81/10/0	82/0/0
English Ingots..	84/10/0	85/0/0
Banca	88/0/0	0/0/0
Billiton	82/0/0	0/0/0
OILS.		
Linseed .....ton	21/0/0	21/5/0
Cocoanut, Cochin	29/0/0	0/0/0
Do. Ceylon	26/10/0	26/15/0
Palm, Lagos.....	26/0/0	0/0/0
Rapeseed, English pale	24/0/0	24/10/0
Do. brown	22/10/0	23/0/0
Cottonseed ref....	21/0/0	0/0/0
Oleine	20/0/0	23/10/0
Lubricating, U.S.	4/0/0	5/0/0
Do. refined	5/10/0	12/0/0
TAR—Stockholm barrel	0/18/6	0/0/0
Archangel	0/12/6	0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.*

BOURNEMOUTH.—For lengthening pier and landing-stage for the Corporation. Mr. Frank Robinson, C.E., Westminster Chambers, 13, Victoria-street, Westminster, London, S.W. Quantities by Messrs. R. L. Curtis & Sons, 119, and 120, London Wall, E.C.:—

Perry & Co.....	£15,480	0 0	The Widnes Foundry Co. £10,977 16 9
Whessoe Foundry Co.	14,151	0 0	W. Hill & Co. 10,949 0 0
Pethick Bros....	13,644	0 0	Murdoch & Cameron, Glasgow* .. 10,370 0 0
George Double ..	12,371	18 1	
Alfred Thorne....	11,586	0 0	

*Accepted.

BURNLEY (Lancs.).—Accepted for the execution of about 370 yds. of piling alongside the river at Altham, for the Corporation. Mr. F. S. Button, C.E., Borough Surveyor, Burnley:—
Thos. Craven & Sons, Blackburn £826 2 6

CAMBRIDGE.—Accepted for the erection of a pair of villa residences, Tenison-road. Mr. Sidney French, architect, Cambridge:—
W. Saint £1,834 0 0

CARMARTHEN.—For the erection of school buildings, Johnstown, for the School Board. Messrs. Geo. Morgan & Son, architects:—

	Stone.	Brick.
E. J. Evans	£2,278 0	£2,178 0
J. & D. Jones.....	2,156 12	2,116 10
Joseph Jones.....	1,995 0	2,120 0
W. Davies, 5, Union-street, Carmarthen (accepted).....	1,887 0	1,767 0

DOVER.—For the erection of new hall and improvements, for the Corporation. The Borough Surveyor and Mr. E. Fry, Architects. Quantities supplied:—

G. Lewis & Son	£1,500	H. Richardson	£1,395
J. Wise.....	1,493	G. Keeler.....	1,388
J. Hall	1,452	Austen & Lewis*.....	1,382

*Accepted.

DOVER.—For constructing footpath, building a wall, &c., by Barton Farm, for the Town Council. Mr. Walter Thomas, C.E., Borough Engineer and Surveyor;—

G. Lewis & Sons.....	£573	H. Richardson, Dover* ..	£382

*Accepted.

DOVER.—For pulling down and re-erecting Union Hall, workshops, offices, &c., for the Town Council. Mr. W. Thomas, Borough Engineer and Surveyor:—

G. Lewis & Sons....£1,500	0 0	G. F. Keeler £1,388	14 11
J. J. Wise	1,493	0 0 Austen & Lewis,	
J. Hall	1,452	2 6 Dover*	1,381 19 0
H. Richardson	1,395	0 0	

*Accepted.

GOOD EASTER (Essex).—Accepted for new farm buildings Mr. R. Mawhood, architect, Chelmsford:—
W. Baker, Danbury £1,064 0 0
[No competition.]

HASTINGS.—For alterations and additions at 28, Havelock-road, for Messrs. Ferrari Bros. Mr. H. Ward, architect, Hastings:—

Harman.....	£786 0	Vigor & Co.	£723 0
Snow	729 0	Warman	710 10

LEEDS.—For the erection of a gardener's cottage, Armley Park for the Corporation:—
Josiah Walker £308 0 0

LEICESTER.—For rebuilding St. Stephen's Presbyterian Church hall, and offices, with a new manse, on the new site, De Montfort square, Leicester, for the Rev. J. W. Miller, B.A., and Building Committee. Mr. A. R. G. Fenning, architect, 46, Lincoln's-inn Fields, London, W.C. Quantities by Mr. J. R. Manning, 72, Milkwood-road, Herne Hill, S.E.:—

Edwin Fox	£6,435	Hinson Bros., Stamford,	
J. E. Johnson	5,406	Lincolnshire*	£4,315
J. O. Jewsbury	4,950	*Accepted.	

LONDON.—For the erection of studio at No. 49, Addison-road, W., for Mr. Herbert Schmalz. Mr. John W. Simpson, architect, 10, New Inn, Strand, W.C. Quantities by Messrs. Pinks & Watson, Parliament-street, S.W.:—

Holloway Brothers	£2,177	W. Johnson & Co.....	£1,992
Wm. King & Son	2,109	Walter Wallis	1,917
J. Kinninmont & Sons....	1,997	Rice & Son	1,787

LONDON.—For rebuilding "The Freemasons' Arms" public-house, Long-acre, W.C., for Mr. Avary. Mr. Charles J. C. Pawley, architect, 2, Prince's Mansions, Victoria-street, Westminster:—

Prestige & Co.	£3,690	Patman & Fotheringham..	£3,517
William Brass & Son	3,615	T. Turtle & Appleton	3,495
F. & H. F. Higgs	3,550	Battley, Son & Holness*..	3,377

*Accepted.

LONDON.—Accepted for rebuilding "The St. John's" tavern, Tooley-street, S.E. Mr. Charles J. C. Pawley, architect, 2, Prince's Mansions, Victoria-street, Westminster:—
Gill & Co. £4,500

LONDON.—For painting and repairs to be done at Nos. 31, 33, and 35, Bevenden-street, East-road, Hoxton, for Messrs. Fullwood, Bland, & Hurran. Mr. W. F. Potter, architect:—

S. Hayworth & Sons £124	10	R. Maskall	£110 0
O. G. Smith	110 0	F. Dawes, Peckham*	£95 0

*Accepted.

LONDON.—For erecting boiler rooms and coke stores, and fitting up hot water warming apparatus at the two Diphtheria Blocks of the Eastern Hospital, Homerton, for the Metropolitan Asylums Board. Messrs. A. & C. Harston, Architects, 15, Leadenhall-street E.C.:—

J. & F. May £710	0	Sugg & Co.....	£545 10
Fraser & Fraser	640 0	J. & F. Clarke*.....	450 0
J. Edmunds	595 0	*Accepted.	

LONDON.—For engineering work, consisting of boilers and work in boiler-house, laundry-fittings, steam and hot water warming and hot water supply apparatus, and other work, for the Guardians of the Poor of St. Pancras. Messrs. A. & C. Harston, Architects, 15, Leadenhall-street, E.C.:—

Clements, Jeakes, & Co. ..£8,650		J. & F. May.....£7,645	
W. J. Fraser & Co.	8,270	Benham & Son	7,050
Berry & Sons	7,895	J. Fraser & Son (accepted)	6,440

LONDON.—For additions to the Dulwich Constitutional Club East Dulwich Grove, S.E. Messrs. Boulnois & Warner, architects, 6, Waterloo-place. Quantities by Mr. Walter Davies, F.S.I., 6, Waterloo-place:—

Wm. Downs.....£1,351		John Frampton	£989
Hall, Beddall & Co.	1,080	Burman Sons	940
Geo. Hosking	1,043	Goldman Co.	939
Wm. Smith	997		

LONDON.—For water-mains and hydrants at the Western Hospital, Fulham, for the Metropolitan Asylums Board. Messrs. A. & C. Harston, Architects, 15, Leadenhall-street, E.C.:—

Thames Bank Iron Co. ..	£260 0	Aird & Son (accepted) ..	£195 0
Johnson & Co., Ltd.	198 10		

LONDON.—Accepted for the extension of the Brooke-road sorting office, Stoke Newington, for Her Majesty's Office of Works:—
H. Knight & Son, Tottenham £569 0 0

MARPLE (Cheshire).—Accepted for the erection of new Wesleyan schools, Marple, Cheshire:—
G. Grundy & Sons, Middleton..... £1,175 0 0

MIDDLETON (Lancs).—Accepted for the erection of a new chancel and vestries at Rhodes, New Jerusalem Church, Middleton. Mr. T. A. Fitton, architect, Long-street, Middleton, Lancs. Quantities by architect:—
W. & H. Thorp, Rhodes..... £175 10 0

SHEERNESS-ON-SEA.—Accepted for the erection of houses for Mr. A. W. Howe. Messrs. Shearburn, architects, Effingham House, Arundel-street, W.C.:—
Pavey, Sheerness £1,575 0 0

SOUTHAMPTON.—For erecting new stabling at the Shirley terminus, for the Southampton Tramways Company. Mr. R. M. D. Lucas, architect, 1, Portland-street, Southampton. Quantities by architect:—

T. J. Jukes	£325 0	F. Osman	£297 0
J. P. Beer	318 0	C. Barter (accepted)	287 0
G. Powell.....	305 10	(All of Shirley).	

[Protecting estimate, £313.]

WHISTON (Staffs.).—For additions, &c., to school buildings, Messrs. R. Scrivener & Sons, architects, Hanley:—
Pattinson ..... £269 | Cooper, Whiston (accepted) £250

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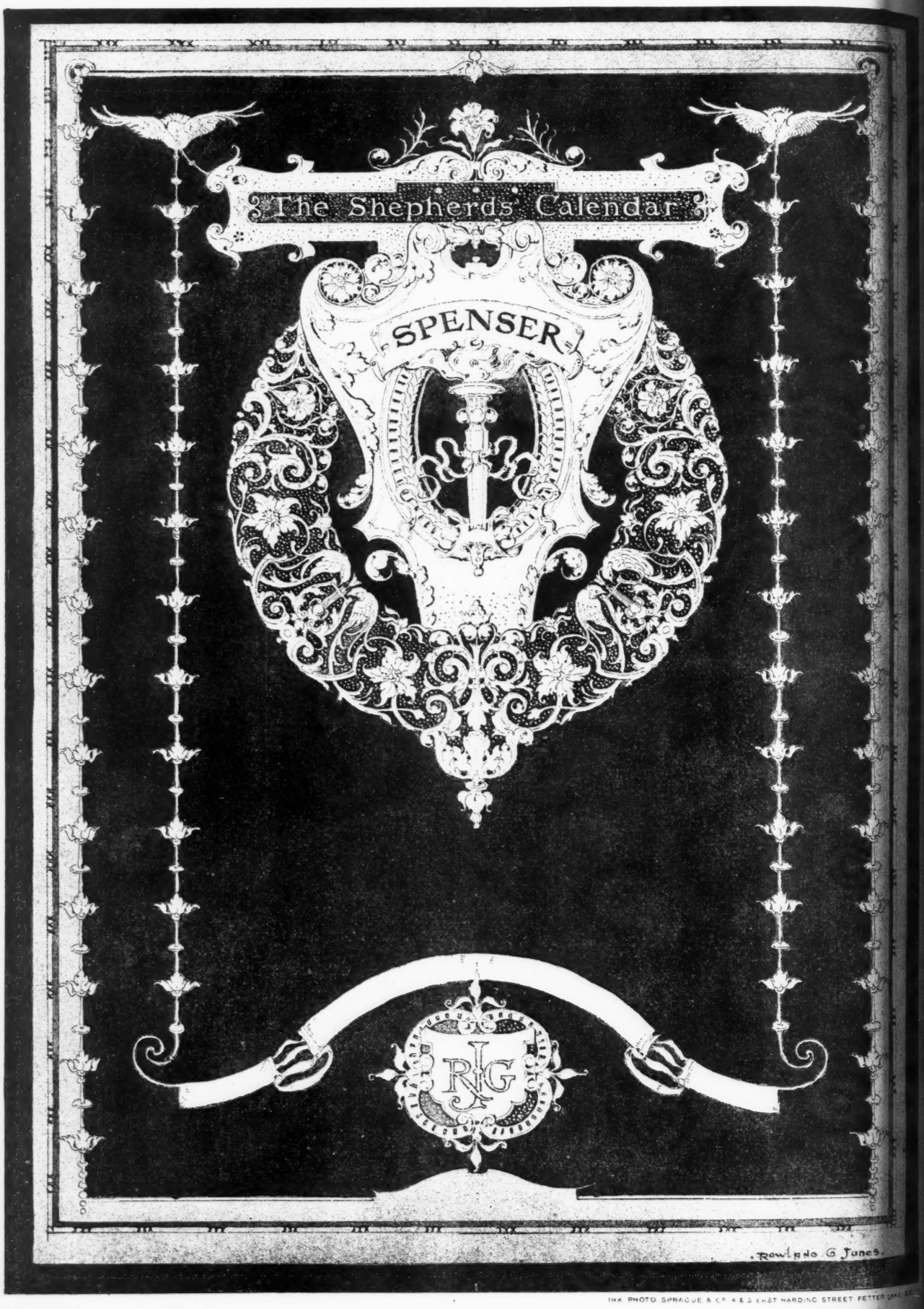

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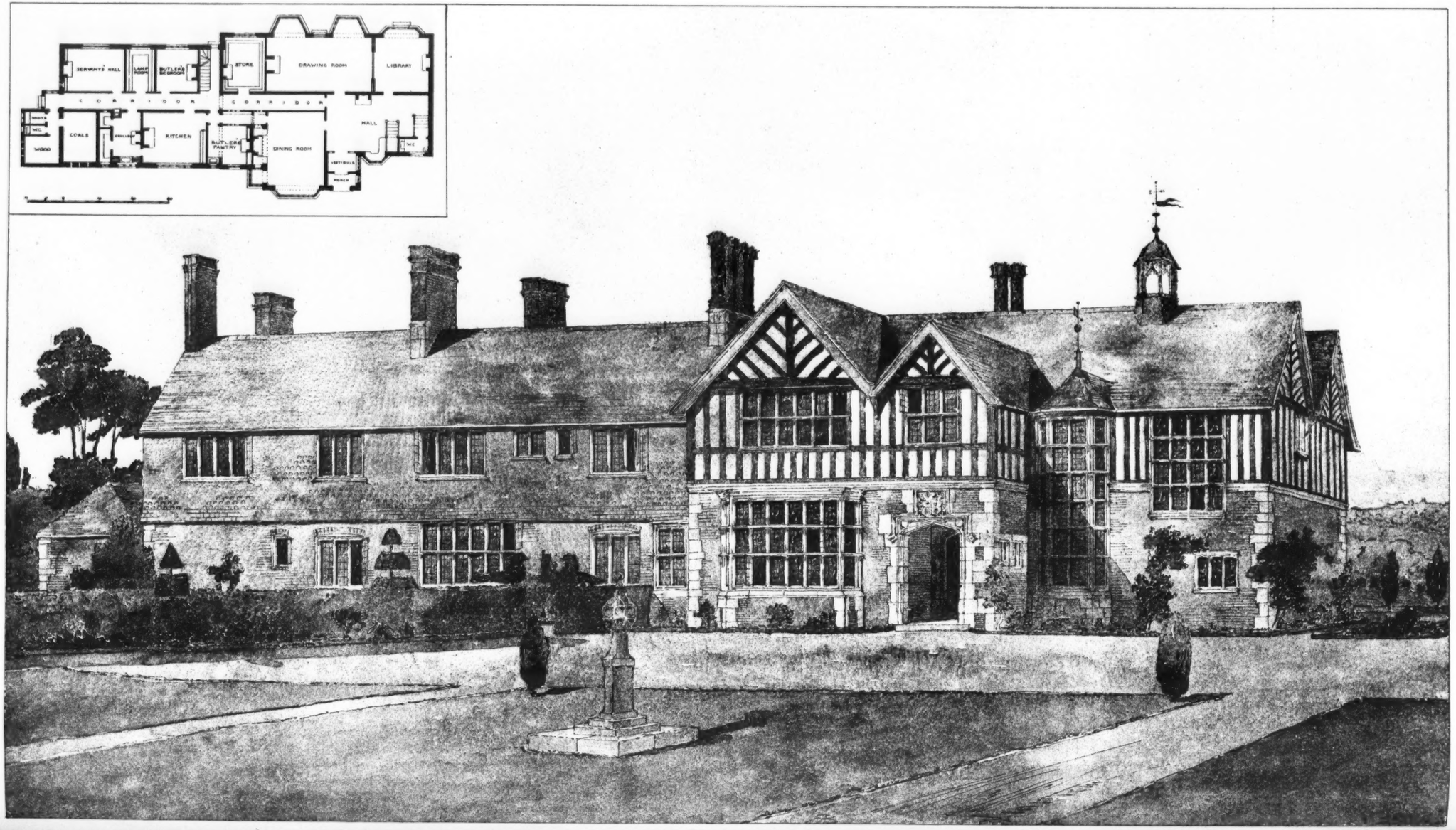

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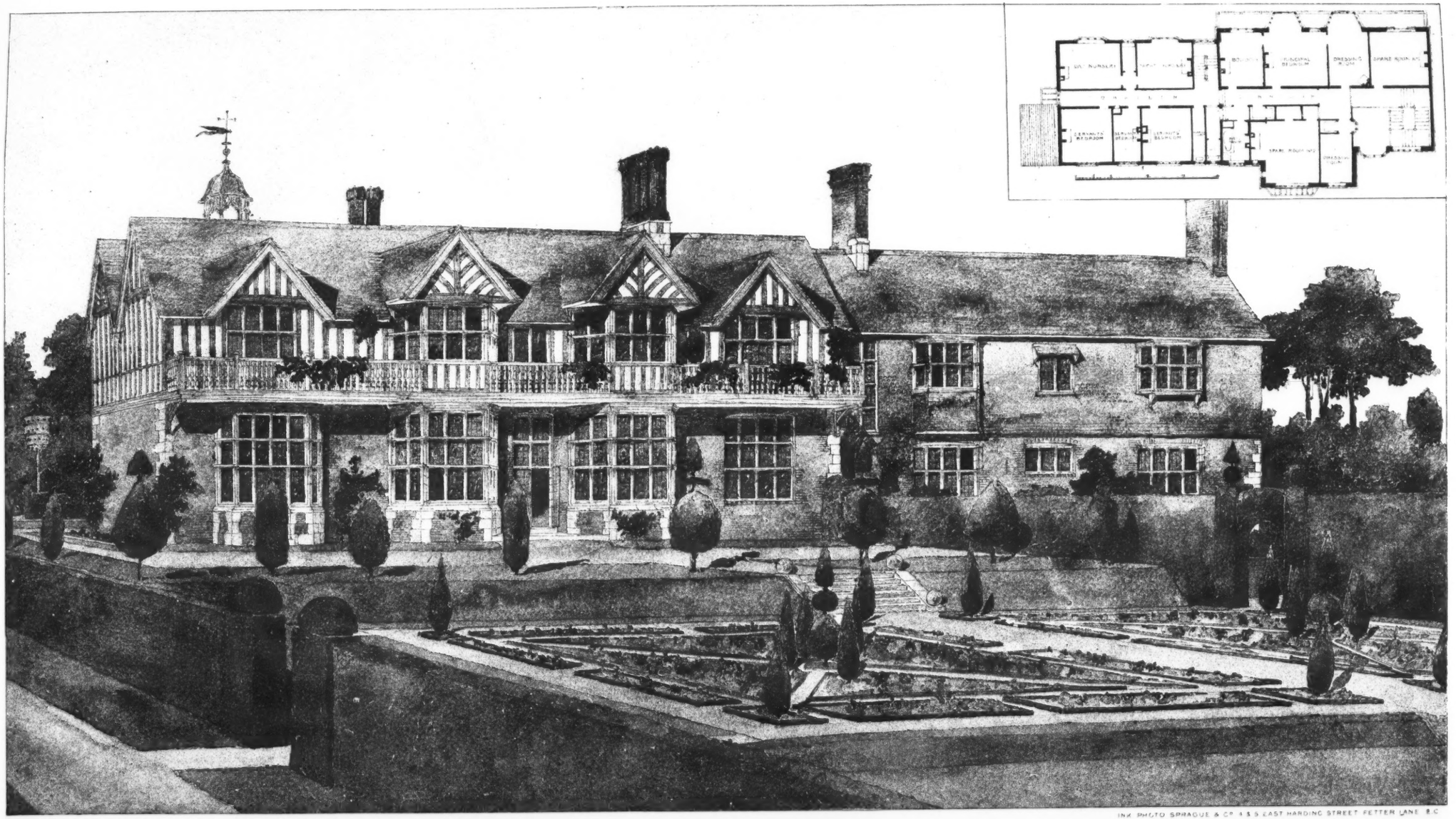

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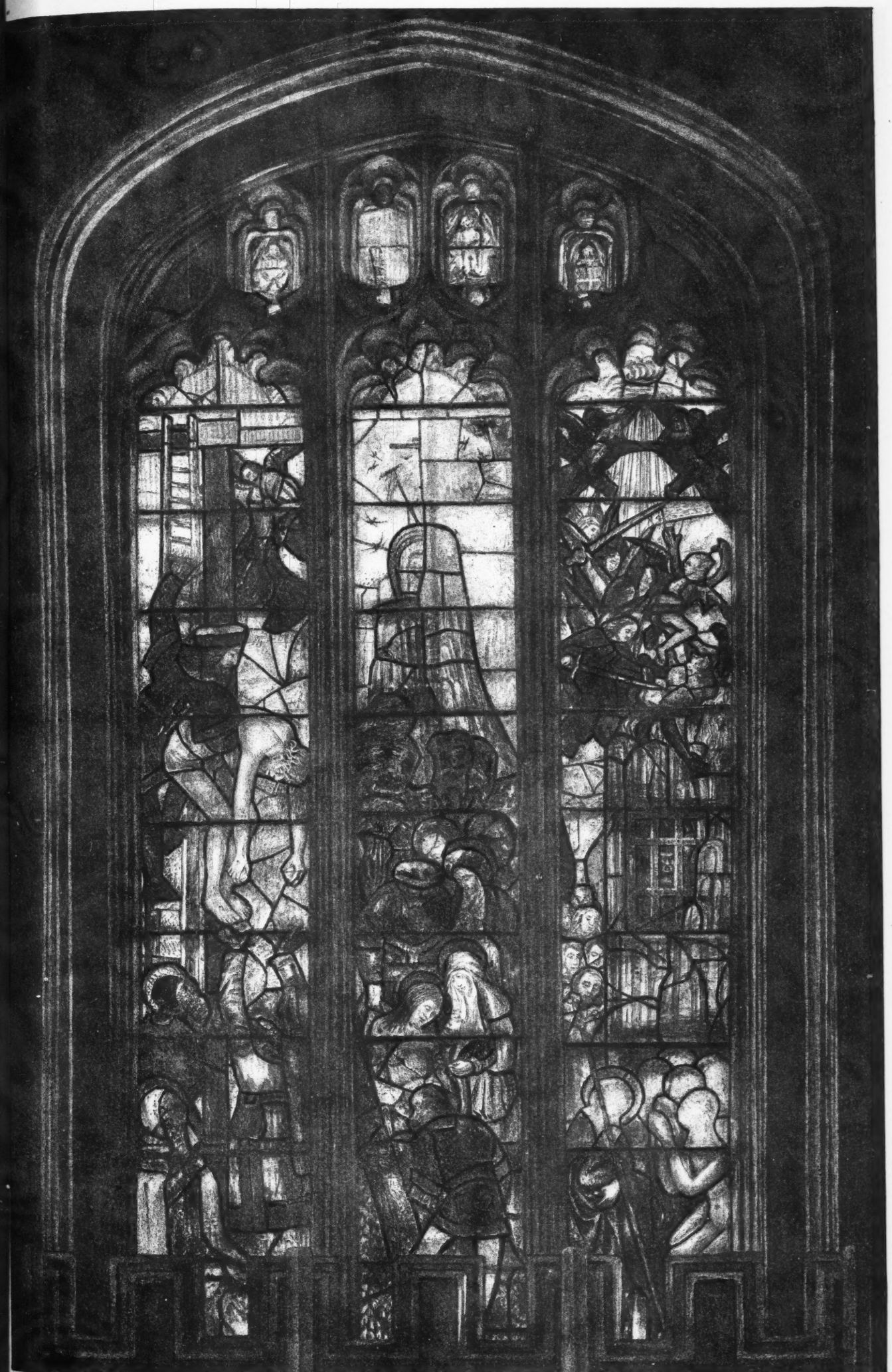

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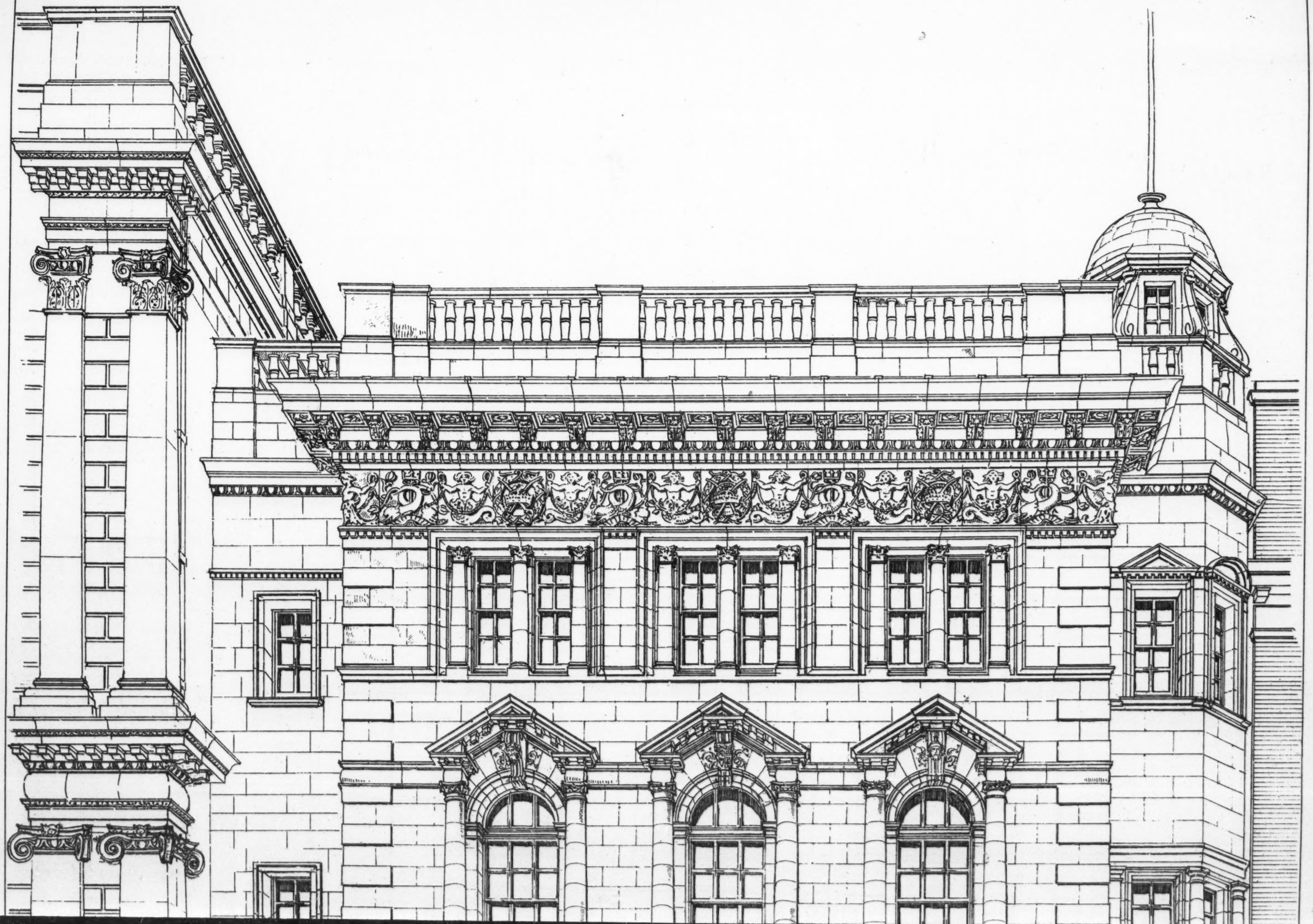

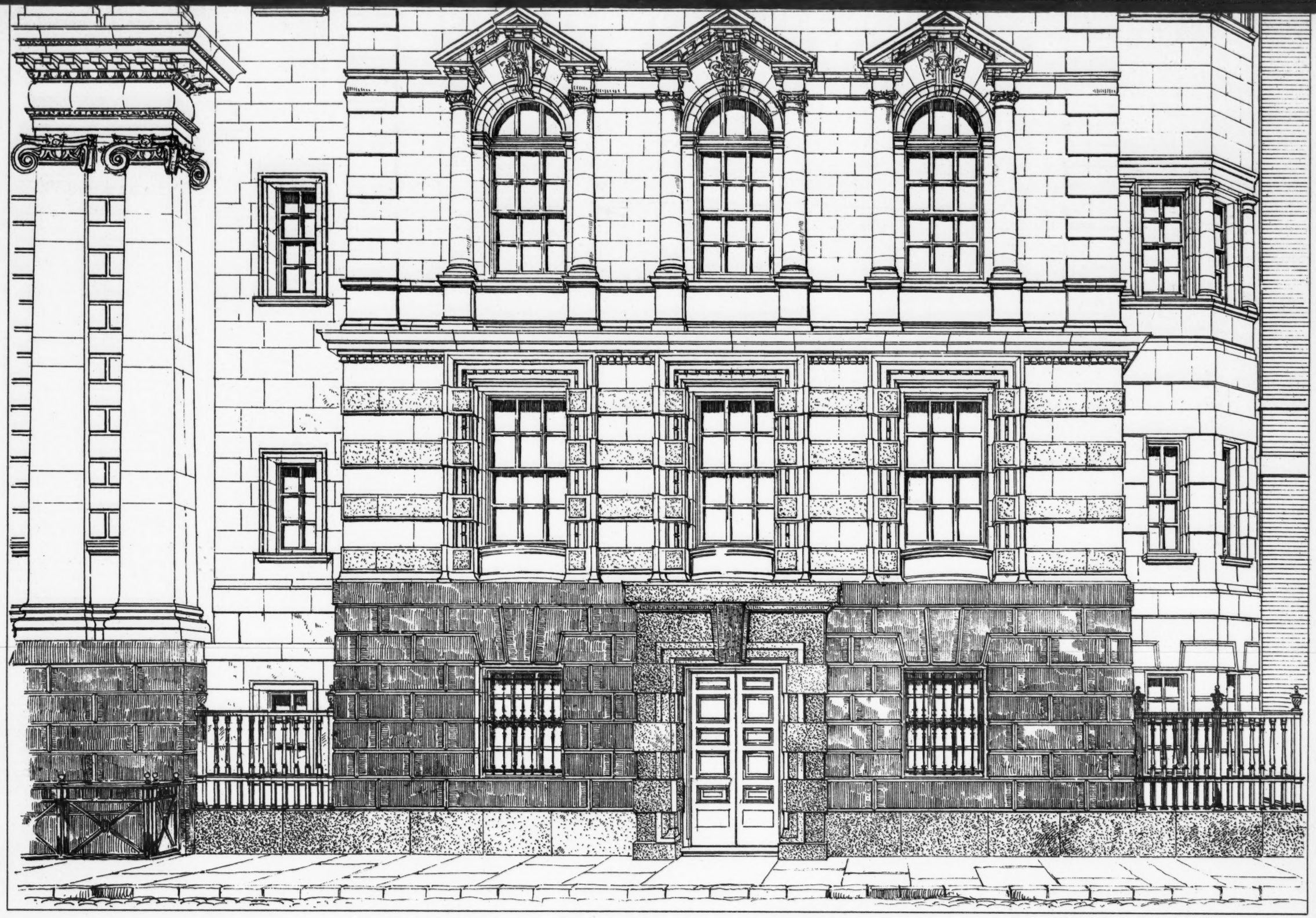

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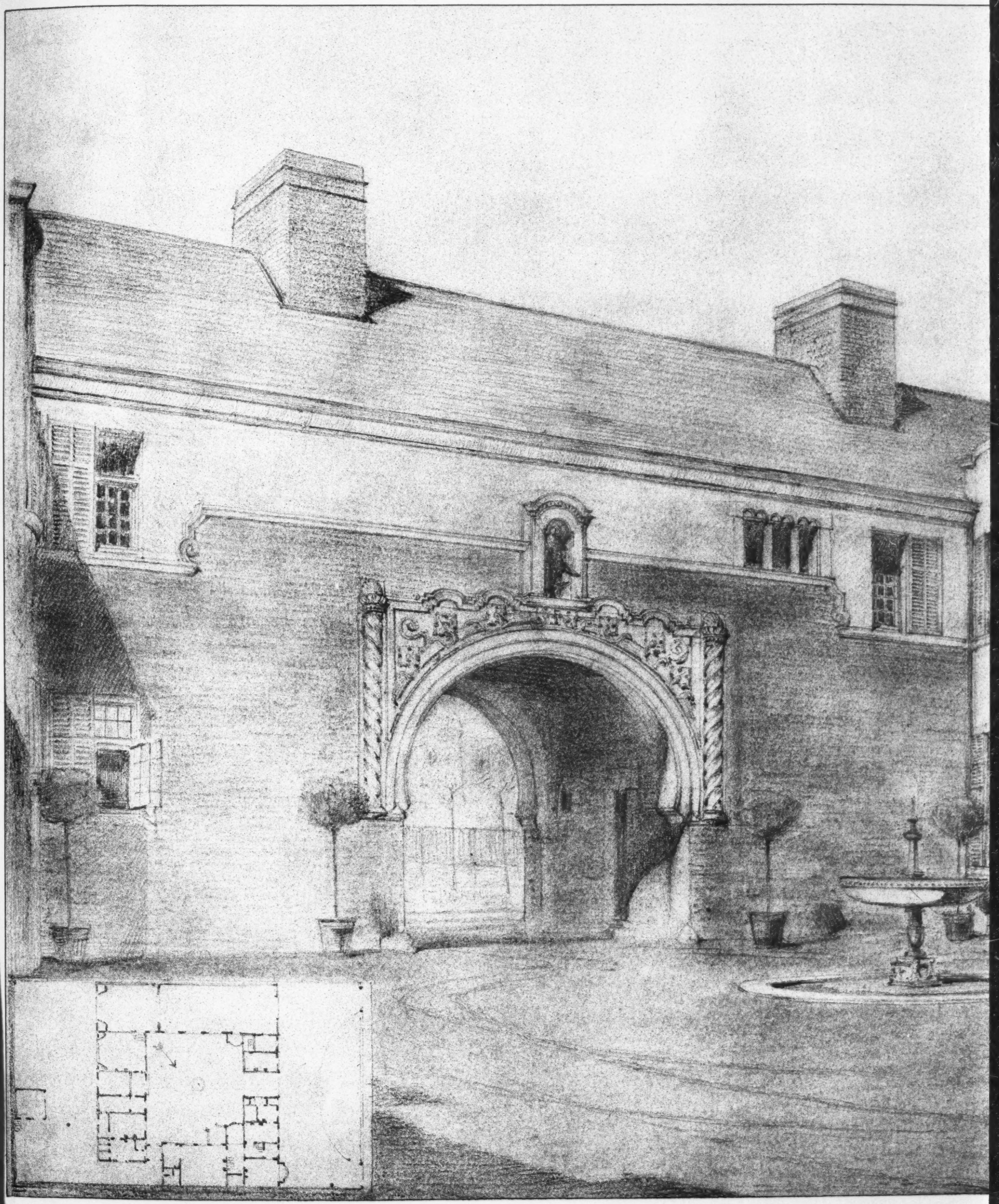

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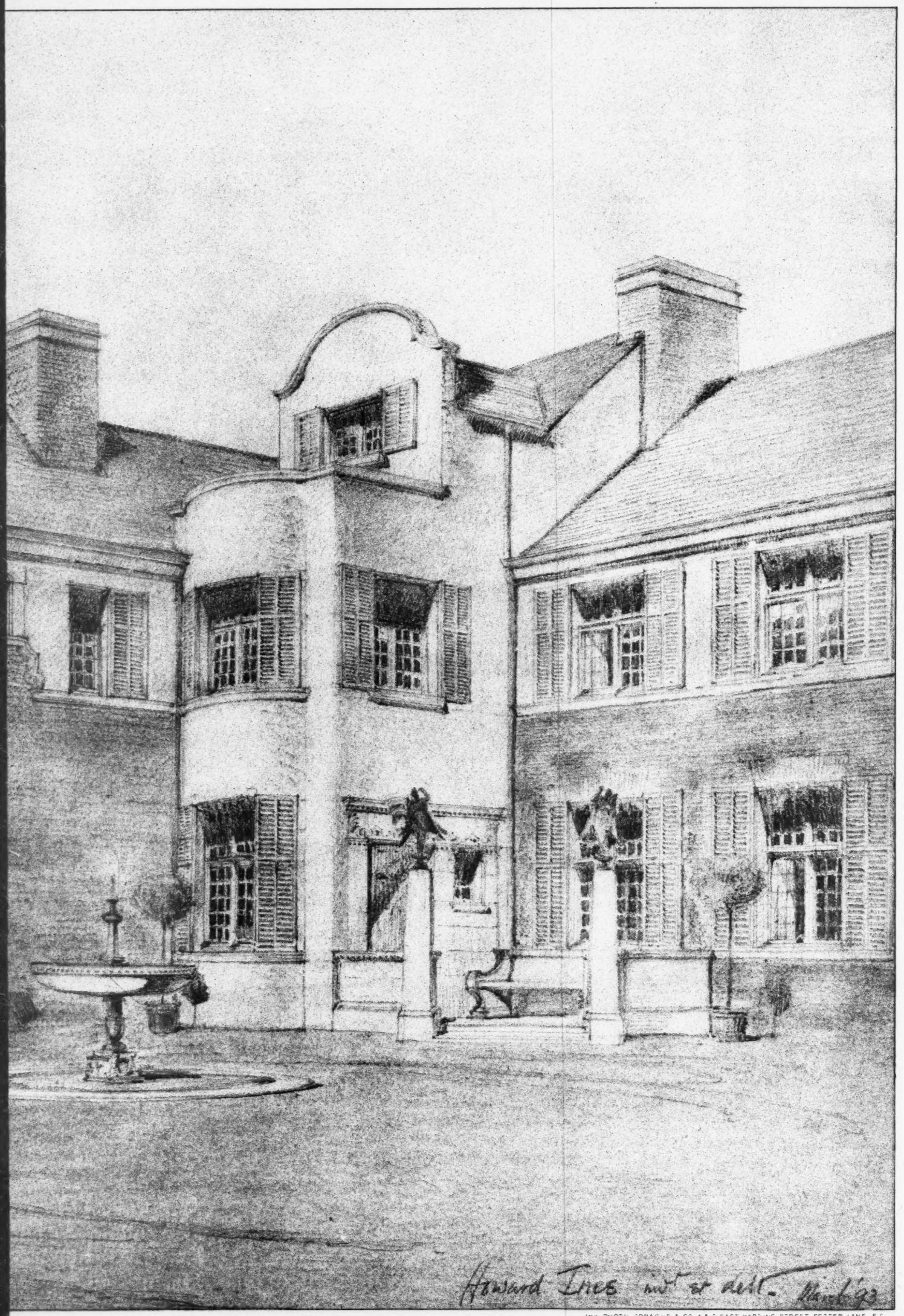

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